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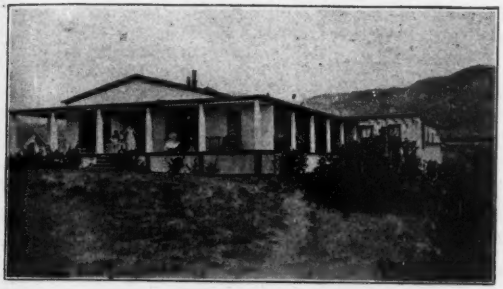

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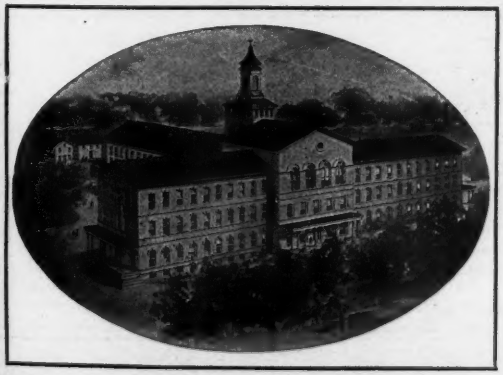

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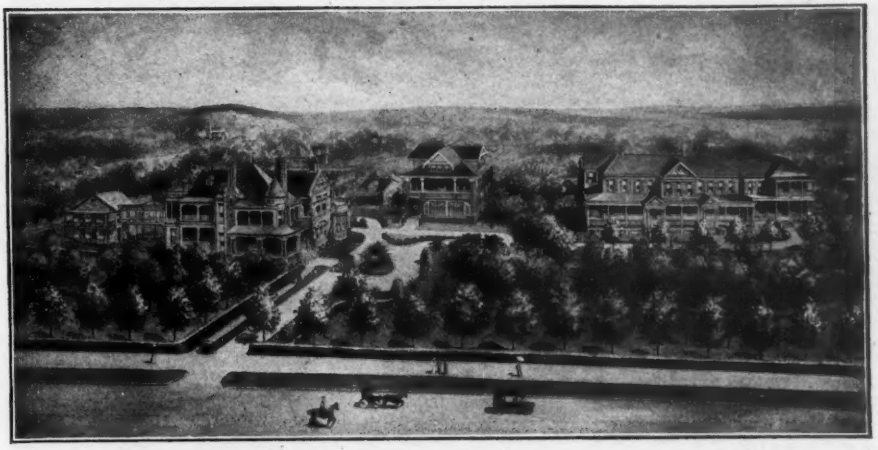

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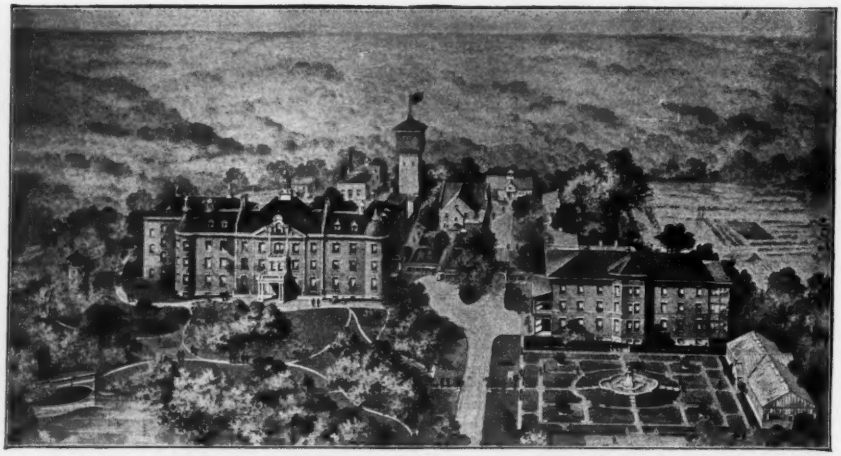

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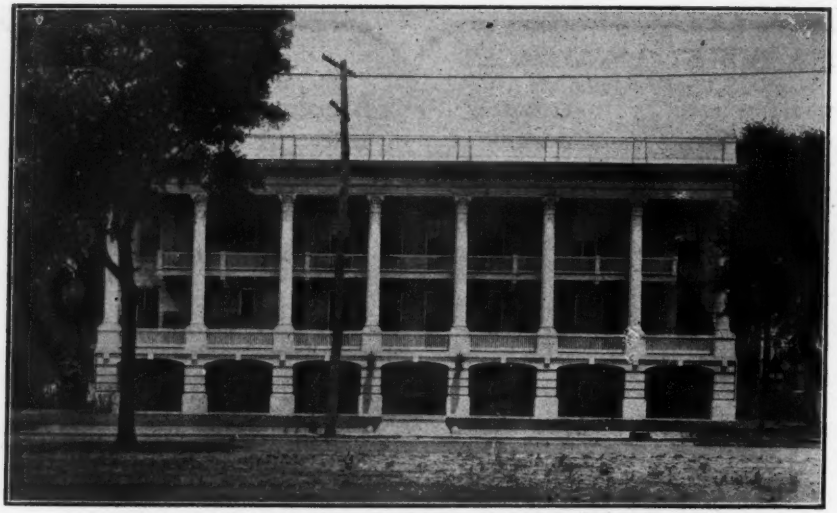

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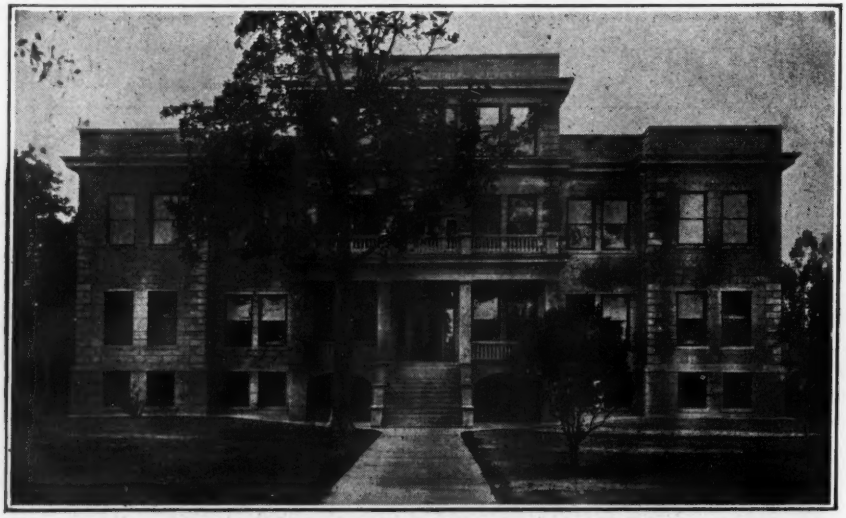

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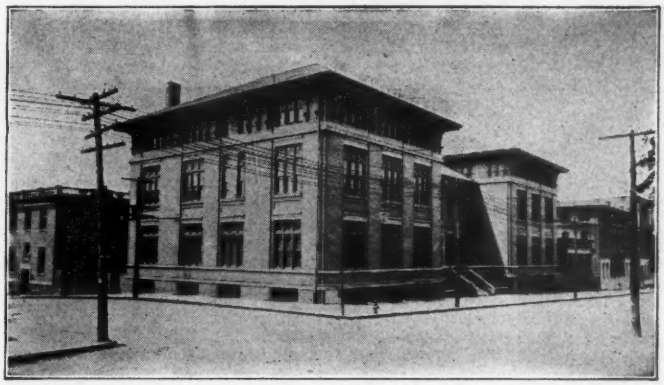

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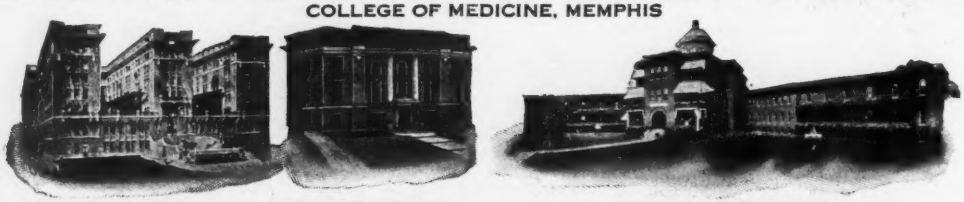

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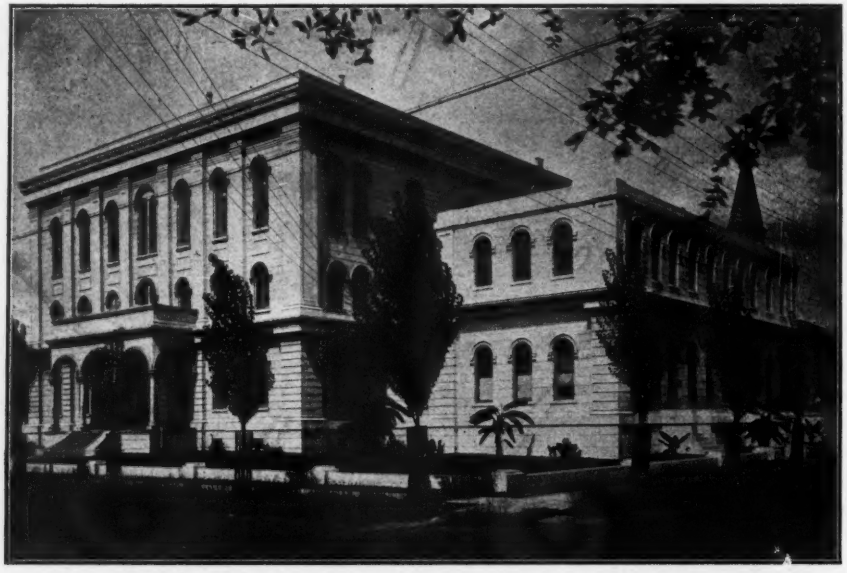

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SOUTHERN MEDICAL JOURNAL

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ORIGINAL ARTICLES

THE ERADICATION OF MALARIA.*

By SURGEON J. H. WHITE,
United States Public Health and Marine Hospital Service, New Orleans, La.

Appreciating to the fullest extent the great honor done me in calling me to the chair so recently occupied by Gorgas and Thayer, I shall make no apology for in some measure following the example set by my illustrious predecessor at the New Orleans meeting when he utilized the President's address as a fitting opportunity to present the idea of a school of Tropical Medicine in the South, and did so with such telling effect that strong and effective work was at once begun by such men as J. Birney Guthrie to obtain endowment and establish within Tulane University such a school. It was successful, and its success is attested by the presence here of Dean Wellman, of the Tulane School of Tropical Medicine.

I cannot hope to attain any such results, but do hope to arouse some thought along the line of the subject discussed.

I cannot even hope to say one single new thing—to advance any thought not already passing through the mind of some one here present.

I take it that the prime object of meetings such as this one, is to arouse mutual interest in topics which, with some, may have become dormant, or by presenting them, from what may be to some a new angle of the same old prism, to arouse fresh interest followed by fresh effort and perhaps fresh results.

I exclude minuteness of detail because such detail is the A B C of this subject, and known to all of us.

Plague, cholera, yellow fever, typhus, smallpox have all from time to time taken toll of human life, blasted human happiness and wrecked human endeavor, but, after all, they do but little harm in the aggregate as compared with tuberculosis, typhoid fever, syphilis, gonorrhoea and our time-honored enemy malaria.

Everyone of these latter are as preventable as the former, but how little do we prevent them.

Something has been done, but so little that we can scarcely plume ourselves upon the results attained.

Our attitude toward the diseases ever present with us brings forcibly to mind the lines:

> "Vice is a monster of so hideous mien,
> That to be hated, needs but to be seen,
> But seen too oft—familiar with its face,
> We first endure, then pity, then embrace."

We have made tremendous advances in dealing with the occasional epidemic diseases of the first named, and there is no legitimate reason for not doing the same or better work in fighting our endemic foes, and especially the one which we are now considering.

Permit me to invite your attention to the distant past and to the often made assertions

*President's address before the American Society of Tropical Medicine, Atlantic City, N. J., July 2, 1912.

that the downfall of Greece and Rome were due to malaria.

I shall not attempt to either prove or disprove these assertions, but simply submit a few facts having, as I believe, a distinct bearing there, and also with us in America.

Both the old empires imported African slaves who then, as now, possessed superior resistance to malaria, and with the inevitable result attained in such cases—absorption.

Within recent times negroes have been transplanted to both Americas and the West India Islands, and the inevitable net result of the superior stamina of that race under malarious conditions in the tropics is in evidence today in the complete dominance of the race in many of the low countries and in the gradual recession of the native Indian and the white man.

This is not the case in the malaria free regions in Central and South America.

This statement is not made as a scientific demonstration, nor do I wish it construed as evidence of the least ill-will toward the negro, but simply as food for thought.

I am not sure that the century or two of negro and negroid life in tropical America is sufficient time to give results upon which we may base scientific deductions, but I fear that it is, and if so, then it is manifest, that so long as the physical law of survival of the fittest remains a fact, and very much a fact it still is, then must the white man either destroy malaria in all his heritage or the black man will ultimately possess it through the inexorable working of that law.

There are few if any thinking men of the South who have not been deeply concerned over the degenerate physical status of hundreds of thousands of their compatriots who dwell in malarious lands.

Much degeneration now known to be due to hookworm was once charged up to malaria, but the discovery of Stiles does not wipe the slate and the magnificent benevolence of Mr. Rockefeller still leaves the real malaria untouched.

Taking the year 1910, the registration area of the United States contained 54,000,000 people, practically 59 per cent of our total population. In this area the deaths aggregated 805,000 from all causes and 1,200 from malaria, which is equal to about 2¼ per hundred thousand for the registration area. This may be reasonably correct as an average, but when one considers that in it Savannah is charged with 89 and Memphis 100, you can see that this estimate is wide of the mark. New Orleans, nearer the truth, is charged with 9.7, but I am sure from my personal knowledge that since the installation of drainage in New Orleans even this 9.7 is excessive.

I hope to excite enough interest in this subject to sow the seeds of better work all over the country in the way of reporting malarial disease. In other words, I should like to bring about as different a state of affairs from what exists as possible. Many of us know cases in which physicians, through ignorance, will make a diagnosis of malaria and sign a death certificate giving that as the cause, yet in which the cause is absolutely foreign to this disease and has nothing to do with it. Again, with what is far worse than ignorance, physicians will charge up knowingly even such things as syphilis to malaria; either because they are afraid to wound the sensibilities of the patient or his family, or because the insurance money would not be paid—or any other ignoble cause you wish to name.

You have only to remember the relatively small mortality by percentage of cases as compared with the colossal total in abstract, and then remember that each death represents hundreds of cases, and each case some days of lost work to gather a correct idea of the widespread suffering, ultimate physical degeneration, showing itself in posterity, to say nothing of the gross but vastly important money loss involved through loss of labor.

I do not think that the morbidity is overestimated, although the mortality is largely so. We have all seen in this country just what

can be seen in the Roman marshes—little sallow, pot-bellied, under-developed children, with spleens so large that the outline of them can almost be seen from the outside, and can be palpated wtihout any trouble. It is evident that this causes physical deterioration, not only in the individual, but also, as a consequence, in the race. We must know that it is important to do away with conditions that sap the vitality of the race in such a fashion as this, and how can these things be avoided?

It is said that the scientist knows why, the practical man *how*, and the expert—*how and why*.

Thanks to the scientist we all now know why and the *how*, though I fear not many of us can qualify as experts under this specification.

The actual work of eradication of malaria is elemental in its simplicity, but calls for untiring watchfulness and absolute thoroughness.

The essential facts to bear in mind are that the various members of the genus Anopheles all breed in swamp water; that they will travel about 350 yards, with the wind—perhaps more, and knowing these facts we can easily accomplish the eradication of the pests in cities and towns, being aided thereto by the steady increase in value of land adjacent to centers of population making the disuse of such land very costly, and so, from an economic standpoint, hastening the drainage of nearly all save accidental small pools which can, in most instances, be very easily filled or drained. The only remaining problem then, in urban communities, will be lakes and ponds preserved as things of beauty in parks, and there are two ways to meet these cases. First, by seeing that the borders of all such lakes or ponds are sharply and clearly defined by cement edges and the water kept at one constant level by a fixed outlet, and second, by implanting small fish in the water, such fish as the Jamaica negroes call "Millions," which are so small and become so numerous that they will destroy every trace of eggs or larvae deposited in their reach, and their size enables them to get into every possible place where ova might be deposited.

In rural districts the task becomes much more difficult, the swampy area being larger as a rule and the available means for fighting the evil less.

Of course, the remedy here is also complete drainage and cultivation. I can recall more than one instance of the thrifty use of land in my native state having made large areas, once malarious to a pronounced degree, entirely mosquito free, and I can unfortunately recall one in my own possession where the admirable work of my father-in-law has been allowed by thriftless negro tenants to go for naught, and where malaria, banished entirely from about 1870 to 1900, is again in evidence to some extent through the abandonment of the cultivation of an area of some two or three acres of creek bottom land.

To my mind, the filling up of our country with inhabitants has accomplished the desired result already in many parts of the Northern and Middle States, practically obliterating malaria without any interference on the part of physicians; because with population comes an increased value of land, and with that comes the fact that people will not let the land lie idle when it can be put into use at a small cost for drainage. There are still, however, many places where this is not so, and the remedy is first to be applied in a palliative way, by excluding the mosquitoes from houses by means of screens, draining small pools of water near at hand, oiling those which cannot be drained, and never forgetting that our gamete-carrying patients must be given quinine as a protection to their own families.

I have seen with my own eyes, since I was a boy, the gradual recession of swamp land before population in my own State and Florida, and the gradual dying out of malaria before the advent of population. The education of the people has also had something to do with this progress in stamping out the disease. It has long been an idea of the common people

that malaria did not affect them much in the daytime. They thought that if they stayed in the house at night they were all right; that if they slept in the second story they were protected; and that if they had three hundred yards cleared around the house they were safe. Of course, these views are directly in line with the habits of the mosquito.

In the last fifteen years I have known of a tremendous recession of malaria all along the Mississippi River and in the cotton belt, where it used to be impossible for white men to live. That was due to the fact that the planters have been clearing a belt three hundred yards wide around their houses, living in the second story, and keeping the families in the house until the dew was off the grass in the morning. Now, if you apply, alongside of these measures, scientific measures, such as screening the houses, widening the area cleared around them, and wiping out the swamps, you will ultimately wipe out malaria in the entire country, just as it has been wiped out in European countries, without the aid of the Board of Health, the disease having disappeared in these countries before the advent of population.

I believe that to obtain good, permanent, practical results, over wide areas not of public domain but of private property, the only real and lasting solution of the question is the education of the people in the country on the two main points involved. First, to have them fully understand that Anopheles will always breed in any swamp or marsh they allow to remain on their land, and that the presence of Anopheles means sooner or later the certainty that one or more of the family will be stricken with fever, possibly fatally.

Second, that the clearance and drainage of such lands will give financial returns in many instances greater than from their apparently better lands.

By the use of such methods we will annihilate millions of Anopheles, but still leave a large problem unsolved.

There are in all States some bodies of land too large for individual control, and this brings to view another angle of the subject, which I some months ago presented to the Assembled Parish Health Officers of Louisiana, viz.: the necessity for Nation or State to take hold of such localities and provide the drainage necessary for their reclamation.

It is no more impertinent to ask for drainage with health and wealth of the people in view as the net result, than to ask for reclamation of the deserts of the West with wealth only as the incentive, as was done by President Roosevelt and justly applauded by the Nation.

And can we not interest the Nation and the State in the obliteration of the big swamps? Is this not an integral part of the movement that has been started for the improvement of waste lands? Should not a National drainage go alongside of National irrigation? And is it not as important, or more so, that one be done as the other? President Roosevelt's proposition for National irrigation was at first demurred against, then accepted, and later, with its full success, applauded. That proposition led only to public wealth; this leads to both health and wealth. There is no reason why the Nation and the State should not apply their money to the drainage of swamps, and so do that which will lead to the ultimate obliteration of malaria in the United States.

If such a movement is once begun it will go forward to completion more rapidly than the other, and if the vast swamp areas of the South serving the same fell purpose in malaria that the endemic foci do in yellow fever, are drained; if we have our endemic centers of malaria removed, the object lesson will be so strong and so pointed that the people can be easily induced to put their shoulders to the wheel and make this sapper of vitality as rare here in America as in Northern Europe, and so rid us, in part at least of one impending evil, one huge threat to the future of the South, and through the South to that of the whole

Nation, for so closely knit are we today by ties of common interest as well as brotherly love that I had not named my own dear land as South at all save that we have the unfortunate distinction of being the greatest sufferers from this pest.

THE AMERICAN SOCIETY OF TROPICAL MEDICINE: SECRETARY'S REPORT.

By JOHN M. SWAN,
Rochester, N. Y.

The past year has been a most valuable one in the history of the American Society of Tropical Medicine. The very successful meeting, which was held in New Orleans for two days in May, 1911, will long be an epoch in the annals of the Society. The Society's program was notable, and the social features provided by the members of the Society resident in New Orleans and the members of the medical profession in New Orleans will long be a source of pleasant recollection to those members who attended the meeting.

Early in 1912 the Secretary was notified that the Society had been admitted to affiliation with the Congress of American Physicians and Surgeons, and the Council elected Dr. James M. Anders, one of our former presidents, a member of the executive committee of the Congress. As a consequence of this affiliation the Society will meet in Washington in 1913, during the meeting of the Congress.

The committee appointed by the President to report upon the available measures for the prophylaxis of the plague in the United States has not been able to furnish a report at this meeting, as was originally intended. It is hoped that such a report will be forthcoming at the next meeting.

The sixth volume of the transactions will soon be in the hands of the members, and the fifth volume was issued just after the last annual meeting. The coming volume will be smaller than those formerly issued, on account of the fact that some of the papers read at New Orleans have not yet been published. This is a subject that your Secretary would like to call your attention to in order to urge you to furnish your manuscript for publication at the meeting at which it is read.

It is by the distribution of our bound transactions that the activities of the Society can be made known to similar societies and other learned bodies in various parts of the world. The result of American investigations in this field are second in importance to those of no other nationality, and it is through the publications of this body that they can best be made public.

The Society has been invited to participate in the Fifteenth International Congress on Hygiene and Demography, which will be held in Washington in September.

MEMBERSHIP—At the last annual meeting the membership of the Society was as follows: Active, 120; corresponding, 17; honorary, 40. At the last annual meeting three active members were elected. During the year two active members, Dr. Francis X. Dercum and Dr. F. F. Russell, resigned. Two honorary members, Dr. Walter Wyman and Dr. Stanford E. Chaille, and one active member, Dr. John H. Musser, died. One honorary member has resigned and applied for active membership.

The membership of the Society on June 4, 1912, is as follows: Active, 120; corresponding, 17; honorary, 37. Total, 174.

The Council of the Society met in the Hotel Rudolf, Atlantic City, on Saturday night, June 1. It recommends the following candidates

for officers of the Society for the coming year: President, Dr. Edward R. Stitt, Washington; Vice-Presidents, Dr. Richard P. Strong, Manila, Dr. F. Creighton Wellman, New Orleans; Secretary, Dr. John M. Swan, Rochester; Treasurer, Dr. C. Lincoln Furbush, Philadelphia; Assistant Secretary, Dr. Allen J. Smith, Philadelphia; Councillors (to serve two years), Dr. Henry J. Nichols, Washington; Dr. Roger S. Morris, St. Louis; Dr. Seale Harris, Mobile; Member of Committee of Arrangements of Congress of American Physicians and Surgeons, Dr. William S. Thayer, Baltimore.

The Council appointed the following delegates to the Fifteenth International Congress of Hygiene and Demography: Dr. George Dock, St. Louis; Dr. Creighton Wellman, New Orleans; Dr. Henry J. Nichols, Washington.

The Council recommends the election of the following candidates for active membership: Dr. A. Parker Hitchens, Glenolden, Pa.: Dr. G. C. Crandall, St. Louis; Dr. W. E. Deeks, Ancon; Dr. William H. Bell, Cristobal; Dr. A. H. Zeiler, Cristobal; Dr. Victor G. Heiser, Manila; Dr. John T. Halsey, New Orleans; Dr. James S. McLester, Birmingham; Dr. William Krauss, Memphis; Dr. Graham E. Henson, Crescent City, Fla.

A MALARIAL HOT-BED WITHIN SIGHT OF THE NATIONAL CAPITAL.*

By THOMAS W. JACKSON, M.D.,
Fort Washington, Md.

INTRODUCTORY.

Lest the title of my paper be somewhat misleading, permit me to say at the outset that I shall endeavor to discuss some features of the malaria problem as they presented themselves to me in my present work, rather than to discourse upon the existence of this preventable disease in the immediate vicinity of the national seat of government, or to indulge in critical remarks. The practical application of the science of preventive medicine has not been so universally extended, as yet, as to permit any community, class or state to comment carpingly upon the sanitary shortcomings of another, even though the delinquent be our national government, for which we are all more or less responsible.

I simply call your attention, therefore, to the continued existence of malaria upon the Potomac shores of Maryland and Virginia within 15 miles of Washington. My observations relate to the military reservations constituting the river defenses below the capital city. I have no reason to believe that the conditions are better or that less malaria occurs in nearby civil communities. In the military posts in the more immediate environs of Washington, Fort Myer for example, the disease continues to occur annually, but in greatly diminished prevalence, owing to the physical improvements and the efforts at sanitation made and to their repressive effects upon mosquito-breeding. The occasional introduction of imported malaria by troops returning from tropical service doubtless occurs and is to be expected, but this need not discourage us if we gain control over the locally bred anophelines. As a matter of fact, none of the military organizations upon which my observations have been made during the past three years, have seen foreign service or suffered from imported malarial infections. Moreover, I am advised that malaria cases were more than usually numerous in certain government institutions in and adjacent to the City of Washington during 1911, but I personally have not the data to maintain this statement, although I have reason to believe it is correct.

I may be permitted to quote from the annual report of the Surgeon-General of the Army for 1911. The Chief Surgeon of the Eastern Division in his report made the following remark concerning malaria in his geographic division consisting of the eastern tier of states: "There is really but one post that is an opprobrium, Fort Washington, where malaria continues to prevail. We have sanitated Cuba several times, Panama is a health resort, but Fort Washington, within twenty miles of the capital of our country, is a pest hole."

Its rate was higher in 1910-1911 than that of any post in the Philippine Islands garrisoned by white troops, except Camp Stotsenburg. Its abandonment has even been recommended upon these grounds, but it seems to me that the opportunity for a demonstration of the possibilities of modern sanitation at home, which it offers, should not be thus lost.

A fortunate circumstance, but one which has doubtless militated against the recognition of the seriousness of the situation during past years, is the fact that malaria as seen here is practically without a

*Read at the ninth annual meeting of the American Society of Tropical Medicine, held at Atlantic City, June 3, 1912.

mortality rate, a fact which I find best explained by the universal and habitual use of quinine (short of the point of cure, however) by the infected population. Unscientific and unsatisfactory as this empiric home treatment is, it doubtless saves some lives annually.

The material for this paper is largely taken from a special report upon malaria recently made by me, consent to its presentation here having been granted in the office of the Surgeon-General of the Army.

A word with regard to the Fort Washington military reservation, occupied by the military post of that name and located within sight of the Washington Monument. It is situated upon the Maryland shore of the Potomac River, 13 miles below Washington, in Prince George County, Maryland, and comprises an area of 275 acres with a boundary line of 3 1-2 miles, more than half of which is water boundary. The river frontage is generally steep and the upper plain is about 140 feet above river level, is of rolling character and contains the principal post buildings and the parade ground. From this plain descends, on all sides, great ravines of varying steepness. All are heavily wooded and covered with undergrowth. Springs occur upon the side hills here and there. The larger ravines number seven. Two of them discharge into a swampy area of 27 acres of mosquito-breeding land which abuts upon the government reservation but is privately owned. This swamp is believed to breed most of our mosquitoes, and the intervening forest and underbrush, extending to the very back doors of quarters and barracks, afford them ideal shelter.

In March, 1911, the War Department evidenced a special interest in the control of malaria at Fort Washington, Md., by convening a Board of Officers (S. O. 71 W. D., Mar. 27, 1911) to visit the fort, to inspect, to investigate, and to recommend measures for the correction and abatement of a condition which has long been discreditable and which is entirely out of harmony with the record of sanitary accomplishments by the United States Army in recent years in various parts of the world.

This board was composed of two medical officers, both eminent sanitarians, and a line officer of practical ideas and experience. The report of the board was promptly made and was complete in its conclusions as to the causes of the situation investigated and was full and specific in its recommendations as to the remedy. While the board's recommendations have never been officially approved and carried out by War Department orders, the Medical Department of the army and the commanding officer at Fort Washington have jointly undertaken the corrective measures recommended, so far as their ability and authority extends, with the result, thus far, of decided accomplishment along the lines of physical and medical measures recommended. The vital lack of money and specific authority for thorough deforestration has been and still is a most formidable obstacle.

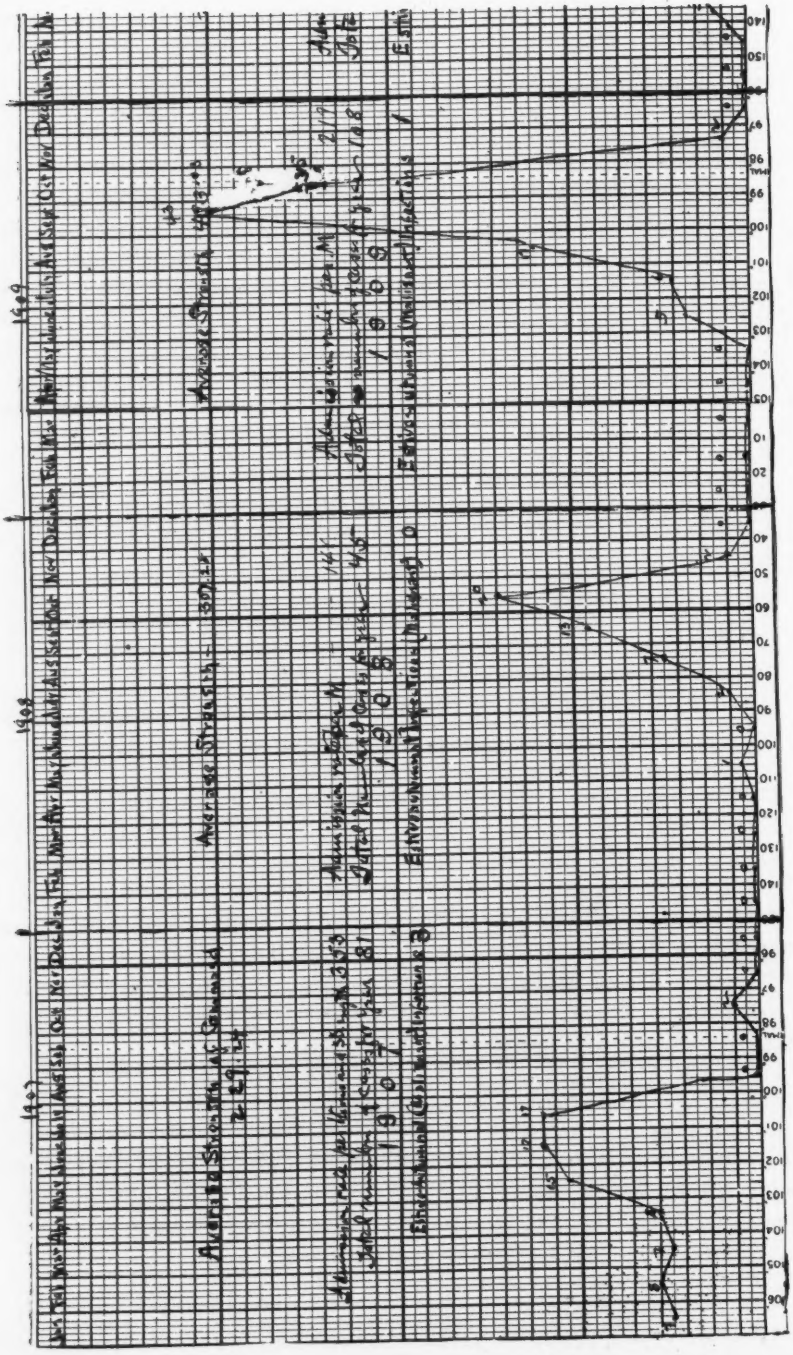
In November, 1911, at the instance of the Surgeon-General's office, I was transferred from Fort Hunt, Va., on the opposite shore of the Potomac, to this post for the purpose of assisting in carrying out the medical measures proposed by the board.

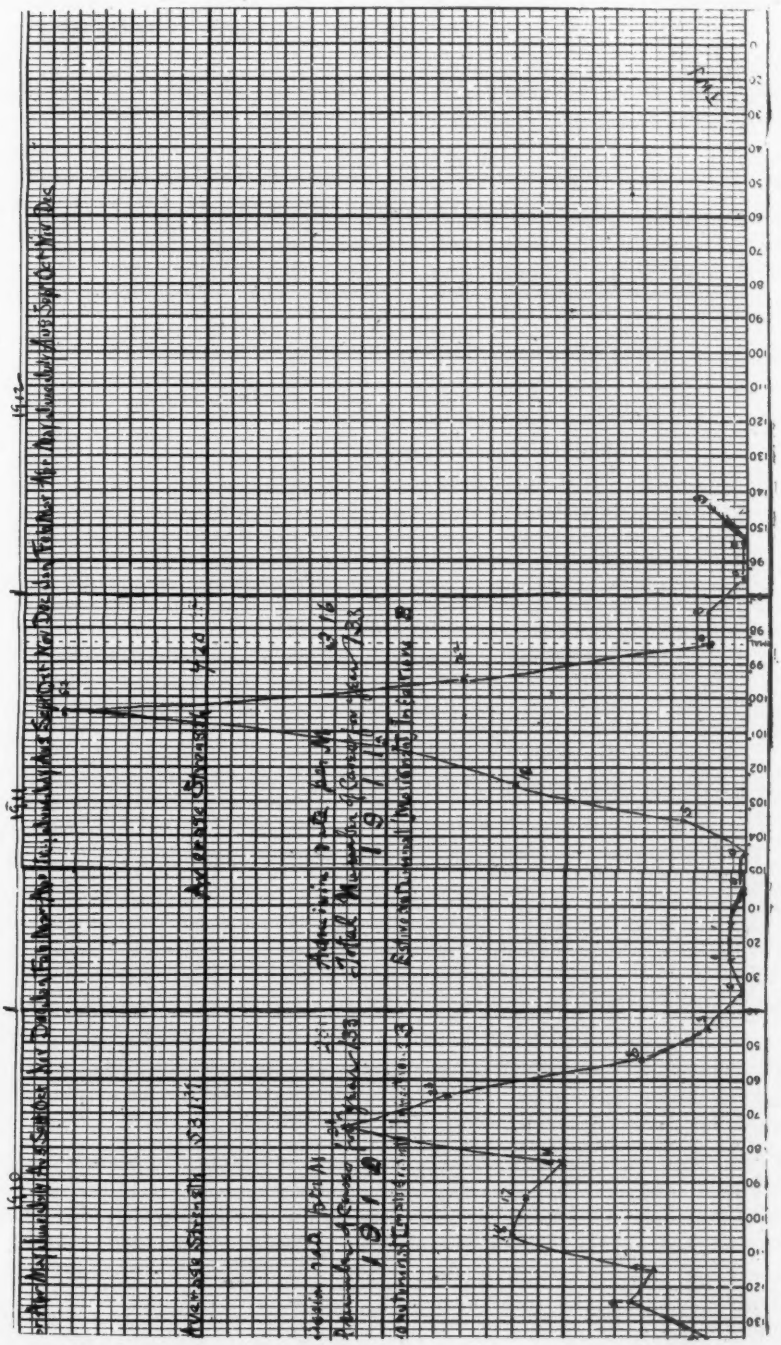
The commanding officer, upon the recommendation of the post surgeon, detailed me as special sanitary officer, with duties confined to the study, cure and prevention of malaria. I have exercised these functions since December 5, 1911, and beg to submit the following observations, pursuant to the duties in which I am engaged.

I have prepared a chart showing the monthly incidence of malaria cases at Fort Washington for five years, with admission rate per thousand of strength and average strength of command and the number of malignant (aestivo-autumnal) infections.

I will not refer at this time to the tree-cutting measures undertaken by the commanding officer, except to remark that the total work accomplished in six months, with very limited funds and chiefly by post labor, is remarkable and must be seen to be appreciated. The engineering measures relating to the drainage of ravines and the conveyance of storm water have also been prosecuted to a very creditable degree, considering the financial handicap, and we will at least approach the mosquito season of 1912 with much improved physical conditions, although the deforestration project is only begun.

The medical phases of the problem are especially interesting. A few of the most impor-



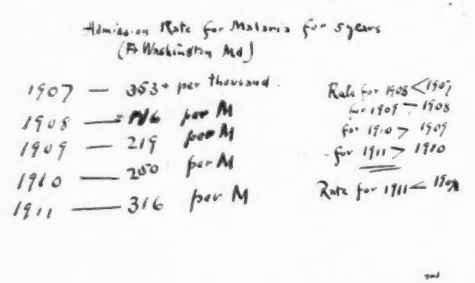


tant questions which have arisen may be mentioned.

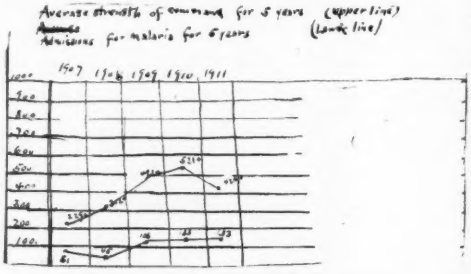
1. The advisability of quinine prophylaxis.
2. The duration of the treatment period.
3. The cause of recurrences and the percentage of cases which are truly recurrent.
4. The management of civilian cases occurring upon the reservation and in the immediate vicinity.
5. The discovery of aestivo-autumnal cases and the disposition of malignant gamete carriers.

Concerning the first of these questions, that of quinine prophylaxis, it must be said that experience at Fort Washington during the past two years has been distinctly disappointing. During the malaria season of 1910 voluntary quinine prophylaxis was practiced by many people of the post, and during the season of 1911 the use of quinine as a prophylactic was directed by post order, upon the advice of the Medical Department, and was carried out in all the companies, five in number, quite systematically.

One needs but to glance at the chart of malarial incidence for these two years to recognize that the prophylactic employment of quinine was a failure here, so far as the reduction of malaria was concerned. I will not enter into an analysis of the possible causes of this failure nor consider the errors of technique which may have contributed, but I beg to refer to two recent publications as indicating something of the present-day feeling among representative medical men engaged in the national anti-malarial campaign in India, with regard to the effectiveness of quinine prophylaxis as contrasted with anti-mosquito measures.


Admission Rate for Malaria for 5 years
(Ft Washington Md)
1907 — 353 per thousand
1908 — 196 per M
1909 — 219 per M
1910 — 280 per M
1911 — 316 per M
Rate for 1908 < 1907
for 1909 > 1908
for 1910 > 1909
for 1911 > 1910
Rate for 1911 < 1907

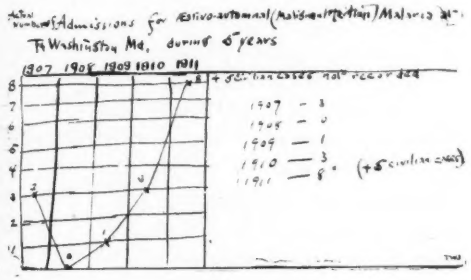
In a forceful and critical study of prison and military statistics of recent years in India and Burmah, Lelean, Captain, R. A. M. C. (7), dissects the claims of the advocates of quinine prophylaxis and finds them unsupported by facts. He gives in tables the result of prophylactic quinine on malaria admission rates at numerous military stations, where various methods of administration were employed, and gives the opinions of medical officers who approached the study with favorable opinions of prophylactic quinine and ended with confessions of disappointment and guarded admissions that it has done little good. Lelean insists that in the military establishments at least the men actually took the quinine under strict supervision and control and that the drug was of excellent quality. He calls attention to the dangers of teaching that the wholesale administration of prophylactic quinine is a simple and royal road to malaria prevention. In the light of the data shown he considers it a false and most dangerous doctrine and combats the plan of the civil administrations in India to abandon more radical measures in the false belief that quinine prophylaxis is an efficient measure in malaria prevention.



At the second meeting of the General Malaria Committee at Bombay, Nov. 16, 1911, the President, Sir C. P. Lukis, Director-Gen-

7. Quinine as a Material Prophylactic: A Criticism, Jour. R. A. M. O., Nov., 1911.

eral Indian Medical Service,(8) stated that the value of general anti-mosquito measures is coming to be understood and to be considered less impossible from financial points of view, throughout India. He stated that the weakness of quinine prophylaxis is beginning to be realized and that no longer is dependence upon this measure to be relied upon solely. He advocated the study of species in the anopheles and instanced the value of such study in the cases of Bentley in Bombay and Christophers in the Andamans, whose discoveries bore directly upon the possibility of great reduction of malaria by attacks upon the individual species responsible in each case. He



advocated malariometric investigations and inquiry into the bionomics of anopheles. The conference, by resolution, while strongly advocating further research, decided that already sufficient information relating to the breeding of mosquitoes is at hand to permit efficient anti-malarial work by trained workers in many places.

In the matter of attempted quinine prophylaxis, then, our experience is borne out by these recent opinions which are based upon official experience in India and it would seem to be profitless to carry this endeavor further, especially as the use of quinine in this manner impairs so greatly the diagnostic value of blood search. Being convinced of the disadvantages of quinine prophylaxis at Fort Washington at the present time, I recommended its discontinuance shortly after my arrival here, with the approval of Maj. Russell, of the board above referred to, and the post order directing it was accordingly revoked.

In Panama, Darling and others have pretty well determined the particular species of anopheles mosquitoes which convey malaria locally and with regard to breeding. Darling (5) remarks that "there is as much selection of breeding places by anopheles as there is selection of feeding grounds by fish. Trout, salmon and bullheads have their analogues among anopheles larvae, some requiring fresh aerated water or water containing much green algae; others select tree-holes and the recesses of tree plants, while others are so adaptable that they will breed in brackish water containing half its volume of sea water; some species require plenty of sunlight, while other sylvan species prefer shady pools in which chlorophyl bearing algae are relatively absent."

These investigations are interesting, but have comparatively little bearing upon our problem at Fort Washington. The practical thing to us here, it appears, is to treat all mosquitoes (and anopheles species certainly predominate here) as if they were vectors of disease and to wage a war of extermination against all, as well as to protect ourselves against the bites of all mosquitoes, regardless of genera and species.

(To be concluded.)

8. Anti-Mosquito Measures in Idnia, Brit. Med. Jour., p. 23, Jan. 6, 1912.

5. S T. Darling, Ancon, Canal Zone, Transmission of Malarial Fever in the Canal Zone by Anopheles Mosqritoes, J. A. M. A., Dec. 18, 1909.

A REVIEW OF THE POSSIBLE AETIOLOGICAL FACTORS IN MALARIAL RECURRENCES: THE SIGNIFICANCE OF SUCH CASES AND THEIR TREATMENT.*

By GRAHAM E. HENSON, M.D.,
Crescent City, Fla.

I think it may be said that our knowledge of malaria—the mode of transmission, prophylaxis and treatment, together with that of the morphology of the plasmodia, may be considered fairly complete, with the exception of that pertaining to the aetiology of recurrences. In reviewing the literature on this phase of the disease, one is impressed with the diametrically opposed views held by the various authorities, all of which are entitled to consideration.

The theories advanced in the past have not been many, and in recent years have been limited to the following:

Parthenogenesis, or the reproduction of the organisms by unfertilized macrogametes.

Intracorpuscular conjugation, this being a process in which the young hyaline forms effect union with each other inside the corpuscle, resulting in a resting body, a resistant form capable of assuming a zygote stage, multiplying after periods of quiescence and only then giving clinical evidence of their presence.

A sexual reproduction by schizogony. This reproduction taking place continually from the time of infection, and continuing after the subsidence of clinical symptoms, but then in numbers insufficient to produce clinical symptoms excepting under certain unknown conditions, when activity is resumed.

Parthenogenesis.

In 1903 Schaudin (1) advanced the theory that the macrogametes took on a parthenogenetic cycle; that is, were able to multiply without fertilization by the microgametes, and attributed to this cycle recurring infections. Several other investigators had previously described sporulating gametes but had not attributed to the cycle the significance that this author did, and while the theory may appear to be a reasonable one, it has not been generally accepted. Deaderick (2) has subscribed to it, but offers no evidence in its support except to cite the case of Frau Kossel, reported by Schaudin, in which it is claimed an alteration of the species was observed. Ross (3) criticizes the deductions drawn from this case, calling attention to the fact that during the period this patient was under observation that the gametes varied in number, and while there was a marked increase in their numbers the day before a paroxysm, considers that there was no evidence that they were not produced from ordinary spores, but that their variation in numbers itself suggests that they were being produced all the time, and that the source of asexual spores from which he considers they were derived were too few to be detected by the method used. He calls attention to the fact that the cells were not actually observed in the process of development, but that it was inferred such development took place from a study of different cells in what was considered different stages of evolution. Deaderick (4), however, in following his line of argument in support of the theory, states that "these relapses at long intervals can be explained by parthenogenesis alone. After the schizonts have perished, while the microgametocytes do not persist long, the macrogametes remain for indefinite periods," In discussing a similar claim made by Schaudin in the benign tertian infections, Craig (5) does not confirm this statement in connection with aestivo-autumnal infections, claiming that the male and female gametes remain in the blood

*Read before the Section on Medicine of the Southern Medical Association, Hattiesburg, Miss., November 12-14, 1911.

for weeks after acute clinical evidence had passed away, and in practically the same ratio during the periods of observation. This has also been my experience in the aestivo-autumnal infections seen in Florida.

In an address before the Liverpool School of Tropical Medicine, Ross (6) stated that many of their cases suffering from relapses never showed any of the sexual forms, thus indicating that they are not a factor in this form of the disease. He and Thomson (7), in a series of cases, record in several of them a marked rise in the curve of sexual parasites, unaccompanied by any rise of temperature. In one case the gametes reached the high number of 1,500 per c.mm., remaining over a thousand for nine days, during which time there was no elevation of temperature notwithstanding the fact that no anti-malarial treatment was instituted. With these cases in mind it is hard to associate recurring malarial infections with the theory of sporulating gametes. If such phenomena resulted in recurrences why is there no elevation of temperature in these cases showing a marked increase in the gametes and unhampered by treatment of any kind. To gather the full significance of this objection to the theory it is necessary to dwell on the aetiology of fever in malaria. There have been theories, but the one advanced by Baccelli (8), in which he claims that the fever is produced as a result of toxines liberated at the time of sporulation, being generated in the corpuscles during the growth of the plasmodia, is now generally accepted. With this fact established, is it not reasonable to infer that if the sporulation of gametes, if such does occur, were a factor in recurrences, an increase of their numbers to any extent would be accompanied by an elevation of temperature. While it may be hard to reject what such an authority as Schaudin reports as a positive finding, we cannot ignore the significant statement made by Thomson (9) that the phenomenon has never been observed by workers in the Liverpool School of Tropical Medicine and "must be very rare, as it would otherwise have been noticed more often."

If it is necessary to adduce further evidence that the sexual forms are not a factor in recurrent infections, it would seem that the question could be absolutely settled by inoculation experiments with blood containing only those forms. Ross (10) cites four such experiments, one conducted by Thayer in 1898 and three by Elting in 1899. All of these were negative, three of them showing neither fever nor parasites at any time, whilst the other case had a slight rise of temperature two and six days after inoculation, but never showed any parasites. While these four cases may be considered as insufficient for final and conclusive laboratory evidence on which to reject the theory of parthenogenesis, they are of great significance, and together with the facts that Schaudin's original deductions were based on a single case of benign tertian, and that all later evidence brought forward in support of the theory has been almost universally rejected, renders parthenogenetic forms (the very existence of which is a matter of great doubt) being a factor in recurrences unlikely.

Intracorpuscular Conjugation.

The phenomenon of intracorpuscular conjugation of the young hyaline parasites was first observed by Mannaberg (11) and later described by Ewing (12, 13). Neither of these writers attributed to it the significance it deserves, and it was Craig (14) who first described in detail the process of development and attributed to the resulting bodies the significance of their being a factor in recurrences, and he has since amplified the findings made in his original report by many additional contributions. I shall not take the time to go into the details of this form of the evolution of the parasite in man, but will refer those interested to the many excellent contributions that the author of this theory has published.*

Darling (15) has confirmed the findings of Craig, saying "the theories of Mannaberg and Craig explain the persistence of latent malaria

by the process of conjugation of two ring forms within a red blood corpuscle." He also reports having frequently seen crescent bodies in latent aestivo-autumnal infections which he considered had been formed by the conjugation of two ring forms. While crescents and the sexual forms of the other types of the infection may be formed as a result of this process, I do not consider that these bodies have any significance in recurrences, or that the sexual forms have any other function than the perpetuation of the species when transferred to the mosquito. James (16) also has confirmed Craig's observations on the formation of these bodies in an aestivo-autumnal infection, and I have in another contribution (17) reported my findings in both the benign tertian and the aestivo-autumnal infections. Other writers have described the process, but in doing so have attributed the bodies as being due to parthenogenesis. Thus in Schaudin's case, which I have already discussed, it is held by many authorities that he mistook the bodies resulting from conjugation for parthenogenetic forms. Neeb (18), in a recent publication, in which he upholds the theory of parthenogenisis, gives the following description of his observations on the ring forms of an aestivo-autumnal infection. "In the infected chromocytes one or occasionally two tropical rings were generally to be found as a rule full grown, which, however, possessed the peculiarity that most of them contained one very large, and some of them a double chromatic mass, whilst the protoplasmic ring was proportionately very broad and coarse." He concludes "that many of them are to be considered as young gametes—future crescent bodies." This is in a certain measure such a good description of conjugating bodies in the process of formation, that it is hard to see why the description is made in support of parthenogenesis. I consider that, without subscribing to the fact, this writer confirms the original deductions of Craig.

I recently had under observation a case of considerable significance toward the verification of conjugating bodies. The patient had been unwell, complaining of a general malaise for some weeks, but showed no clinical symptoms. Following routine procedure his blood was examined for plasmodia. Several smears at intervals covering a period of three weeks failed to reveal the parasite in any of its forms, but at the end of this time several parasites of a ring form, showing unusually large chromatin masses, with the protoplasm also larger than usual and staining an intense blue, were observed. The patient had never had malaria previously. He lived some miles from my home and I wrote him predicting an attack of malaria, which had developed by the time my letter reached him. He was at once put on thirty grains of quinine sulphate per diem, but contrary to the usual result, while the fever disappeared, the same organisms were present in the peripheral blood for several days and proved very resistant to treatment. I did not observe forms in any advanced stage of development, but am satisfied that what I did see were the result of conjugation. Craig (19) has stated that intracorpuscular conjugation never occurs during the first few days of an acute malarial infection, and that on this account it is not seen in initial attacks. The case referred to would indicate that in persons possessing a relative immunity the process may take place even before clinical symptoms of the infection are present, and is still another reason why we should arrive at a diagnosis of these infections as early as possible.

While the different stages of development up to the form of what is considered by Craig to be the pre-sporulating stage have been carefully studied by this author, we have as yet no laboratory evidence that these bodies result in recurrences, and while without such

*These have been many, but I would especially call attention to the very excellent monograph published by Doctor Craig in the Journal of Infectious Diseases, Chicago, Vol. 7, No. 2, March 1, 1910, pp. 300-318, entitled "Studies in the Morphology of Malarial Plasmodia After the Administration of Quinine, and in Intracorpuscular Conjugation."

evidence it is impossible to absolutely fix their significance, I feel confident that they will be proven to be the factor in relapses of long intervals.

Asexual Reproduction by Schizogony.

It has heretofore been thought that the asexual forms disappeared from the peripheral circulation in the intervals between clinical manifestations of the infection. Ross and Thompson (20) have recently shown that this is incorrect, and that the error was due to imperfect methods used for their detection. In conducting some enumerative studies of the disease by the application of the thick film method, they show in a series of cases, by daily counts, that the asexual forms become less and less after an acute clinical manifestation of the disease, sometimes for a few days being zero, and from that to four or five per c.mm., but in many of these cases, although for a few days the parasites cannot be detected, they then slowly increase, giving clinical evidence of their presence only after reaching some hundreds per c.mm. With this demonstration arises the very important question, how long can schizogony continue without giving rise to clinical symptoms, and is it a factor in recurrences of long intervals?

The almost universal opposition to the acceptance of this theory has been that it was unreasonable to infer that schizogony could go on for weeks, months and sometimes for years, sufficiently to maintain the infection, but within such limits as to shut out clinical symptoms for long periods of time.

Deaderick (21), in discussing this phase, says, "While it is probable that brief periods of latency may be thus explained, especially in persons possessing a relative immunity, it is evident that this is not the common mode particularly of relapses of long intervals, since the asexual cycle is known to wear out spontaneously after certain periods." Craig (22) takes a similar position, saying, "It is impossible to believe that the plasmodia of malaria continue to grow and multiply for weeks and even months, within the body of man without becoming numerous enough to produce clinical symptoms." He however, reports having demonstrated parasites in the spleen of patients dying from other disease, and in whom there had at no time been clinical manifestation of malaria. He states that the plasmodia in these cases did not differ from those observed in the peripheral blood and were undergoing normal schizogony. It would be interesting to know the probable time of infection in these cases which is not stated.

Ross (23), who upholds this theory, which he says he "will continue to adopt until a better one is established," in replying to the argument advanced that it is unreasonable to think that the asexual forms can multiply for long periods of time without giving rise to symptoms, but sufficient to maintain the infection, writes, "It is impossible to accept such a train of thought. If 150,000,000 sporids cause but a little fever in a man of medium weight*, 1,000 or 100 should cause none at all, and yet will be quite sufficient to keep the infection alive in him. But if the parasites are so few, what chance has the medical man of finding a single one? If even 1,000 parasites are present in a man of ten stone weight, the chances are that we must search 15,000,000,000 haematids before we find one parasite. At the rate of 10,000 haematids a minute we shall have to search for 1,500,000 minutes, or for twelve hours a day for more than five years before we succeed." These figures, to say the least, strikingly demonstrate the likelihood of negative findings in positive cases.

Now it is very evident that there is a factor, at present undetermined, which is either responsible for the resumed activity of malarial plasmodia in man after periods of latency more or less prolonged, or that checks activity for these periods. Is it possible that this factor is enough to prohibit the multiplication of the parasites to a number sufficient to produce

*This writer by mathematical deductions shows in his work on "The Prevention of Malaria," p. 91, that this is reasonably correct.

clinical symptoms. May it not be the same factor, also as yet unknown, that in untreated cases by the production in the blood of some antitoxic substance prevents the continued multiplication of the parasites to the point that would mean death in every instance. Ross (24) considers that the rallies (a term he has applied to the intervals between clinical manifestations) "are probably due to a great destruction of the parasites by some germicidal power of the blood, or of their toxin by some antitoxic power, or more generally to both. And the relapses are probably due to decrease in both of these factors of resistance."

Significance of Recurrences and Their Treatment.

The significance of a recurring malarial infection lies in the fact that such recurrence is *prima facie* evidence that the original infection was not properly treated and that these patients are not only chronic sufferers of a greater or lesser degree, but in addition are a constant meance to the community in which they reside. Just so long as the infection is present the formation of gametes is a possibility, and just so long are these people capable of transmitting the infection to uninfected mosquitoes who in turn perpetuate the disease in man.

The absence of relapsing cases would mean that all first infections were receiving proper treatment, the neglect of which at the present time is a leading factor in the present endemic index of the disease. Craig (25) states that a great deal of the malaria prevalent in every malarial locality is directly traceable to improperly treated cases, and the prophylaxis of the disease will be immensely helped by the thorough treatment of every infection. He most rightly states that "the practice of regarding such infections as cured because the active symptoms of the disease have disappeared is a most common and a most pernicious one, and one that is responsible for the transmission of a very large proportion of malarial disease." Harris (26) states as his opinion that "there would be but little chronic malaria if the acute cases were cured, but there are today probably two or three million persons in the United States who are harboring malarial parasites.

It has been proven beyond any doubt that the sexual forms require the mosquito as an intermediate host, and that only after a certain period following the ingestion of blood containing these forms is the insect capable of transmitting the disease. While the sexual forms do not appear in all cases whether treated or not, there is plenty of evidence showing that early and efficient treatment arrests the development of gametes by the early destruction of their source of supply. Not only this, but with the knowledge that intracorpuscular conjugation takes place only in the young hyaline ring forms, if these are early destroyed the possibility of the formation of conjugating bodies is removed. The treatment of latent malaria should therefore be largely prophylactic and consists of the treatment of the acute stage to a point where the infection is entirely destroyed, and if this is consistently carried out will have an immense effect in eliminating the infection.

We have evidence that contrary to former opinion the sexual forms can be eliminated from man by continued cinchonization. Darling (27) was the first to demonstrate this fact, which is no doubt effected by the destruction of their source of supply, more than to the direct action of quinine on the forms themselves. The effect of quinine on the formation of gametes is shown by Thomson (28), who reports his observation of a case in which he shows that the first paroxysm with 50,000 asexual spores per c.mm., resulted in 852 crescents per c.mm. Twenty grains of quinine was given during this paroxysm, but none was given for several days before or after it. The next paroxysm where no quinine was given until the day after produced 468 crescents per c.mm., and the next only 344 from 54,000 per c.mm. of the asexual forms. At this period thirty grains of quinine were given daily, a later relapse gave only

4 crescents per c.mm. from asexual spores numbering 16,000 per c.mm.

In the aestivo autumnal infections ten grains of quinine sulphate three times daily for a period of from two to three weeks results in the complete sterilization of the blood, while the dose in the benign tertian and quartan infections can be reduced to twenty grains per day. Tonics with the view of reconstructing the blood, such as arsenic and iron, should be employed where there is evidence of anemia, which is general in all old infections. Skinner and Carson (29) report recently on the efficacy of the application of X-rays, claiming that the splenic pain is relieved and the engorgement of this organ reduced if of recent origin. They report that in cases where quinine was not well tolerated the drug was withdrawn and the rays applied, resulting in the clinical symptoms and parasites disappearing and that they did not have relapses up to the time of writing. The application is, however, not practical where the greatest number of cases have to be treated in rural communities and a static machine unavailable. The use of salvarsan has by some of the enthusiastic users of this drug been heralded as a panacea for many infections, including malaria. I see no excuse for the administration in malaria of a drug which it must be admitted has an element of danger, when we have as comparatively safe a specific for the disease as quinine. Methylene blue advocated for many years by a few observers in the treatment of old infections has lately been given a fresh impetus by the studies of Thomson (30). Surveyor (31) writes on the efficacy of picric acid in crescent infections. He reports results obtained in twenty-two cases, and used as control to this treatment, quinine alone, in thirty-four additional ones. His results were very gratifying.

It having been proven that efficient treatment results in the death of the sexual forms, it becomes very necessary that we should have some practical method whereby we can ascertain when these forms disappear, and the case considered cured. Ross (32), in 1903, introduced what is known as the thick film method. By decolorizing a thick smear of blood and staining the remaining film one is enabled to examine a very much larger quantity of blood than can be examined with a thin smear, and to do it in a much shorter time. James (33) recently reported a modification of the technique suggested by Ross, in which he decolorized the smear with an acidified alcohol, afterward washing the film a sufficient time to insure the removal of all traces of the acid, and then stained. An objection to his technique is the time involved, while the criticisms made on the Ross technique do not seem to be well grounded. I have adopted a modified technique for which I claim a considerable saving of time, which is of paramount significance to the busy practitioner doing his own microscopical work, as well as to the laboratory worker. My technique is as follows:

A large drop of blood is spread over a square inch of the slide, allowed to dry and then immersed in a 5 per cent solution of acetic acid for from one-half to two minutes, depending on the thickness of the smear, or long enough to remove the haemoglobin, then washed in a 95 per cent ethyl alcohol for a few seconds, rinsed in distilled water, covered with a 2 per cent solution of soda bicarbonate for twenty seconds, washed in water, then in alcohol and, without drying, stained. For this purpose I have used Wrights, but in adding the water it is necessary that the dilution be greater than is used when working with a thin smear. The entire process, including the staining, is completed in a little over five minutes. Only such ingredients as are chemically pure should be used, including in all instances distilled water, and it is imperative that the acid should be neutralized or the parasites will not take the blue stain. It is also important that the alkali should not be in excess or the film will take an intense stain from the methylene blue, which cannot be sufficiently washed out without also decolorizing the parasites. Of course in this method, as in all

thick film methods, the relation of the parasite to the corpuscle is lost, making the identification of the parasites more difficult to one not perfectly familiar with the picture.

I may be at variance with most authorities in considering the treatment of the disease the most potent instrument in our hands for its final eradication. With the elimination of gamete carriers the presence of anopheles becomes harmless. Time does not permit a discussion of the situation from an economic standpoint, but with the cooperation of the laity it appears to me that it would be more economical to treat all cases a sufficient time to destroy the sexual forms, than the almost endless task that confronts us in some localities in considering the destruction of mosquitoes. I can say from personal experience that the education of the laity is not such a hard task as it is thought to be. I have made many converts to the cause of individual prophylaxis amongst all classes in my practice, among whom are included some of the most ignorant negroes. I attribute largely to this work the marked reduction of malaria in my community. I cite this personal experience merely to convince the individual physician that auto-prophylactic measures are not to be lightly looked upon.

Conclusions.

Parthenogenesis cannot be considered a factor in recurrences for the following reasons:

1. The very existence of such a phenomenon is a matter of great doubt, many observers working over a period of years having failed to demonstrate such forms.

2. There are many cases reported that have at no time during the infection shown the sexual forms, but have frequently relapsed.

3. The four cases cited by Ross in which inoculation experiments containing only sexual forms, failed in each instance to produce clinical symptoms of malaria, or to reveal the presence of any plasmodia, while in fifty-one cases cited by the same author, inoculation experiments containing the asexual parasites, in every instance produced clinical symptoms of the infection, and parasites of the type inoculated were demonstrated in all of the cases experimented with since the discovery of the plasmodia.

Intracorpuscular conjugation is not an occasional phenomenon, but is generally present in recurring cases. In persons possessing a relative immunity, which permits the parasites to remain in the blood in small numbers for some time, before original manifestations of the infection, conjugating bodies may appear early in the infection. The observations of Craig that certain forms of the plasmodia exist only when conjugation is present and often before gametes have appeared, would indicate that they are a factor in recurrences of long intervals, and while they have only been followed by him to a pre-sporulating stage and further observations on their morphology are necessary to absolutely associate them with recurrences, there is good reason to believe that such studies will establish them as the aetiological factor in long interval relapses.

Asexual reproduction by schizogony is generally accepted as the cause of short interval relapses, but the length of time that the schizont is capable of keeping the infection alive in man without producing clinical symptoms is at present undetermined, and can be only determined by future laboratory observations on an extensive scale.

The acceptance of either or both factors in the aetiology is of biological interest, but whichever is the cause of recurrences, the solving of the problem from the standpoint of the sanitarian lies in the early diagnosis of all primary infections, the efficient treatment in both dosage and the length of time the patient is kept under observation and treatment and the proper treatment of all chronic cases in like manner.

Review medical literature for, say the past two years, and you will find it teeming with articles dwelling on the eradication of hookworm, the treatment of pellagra, the use of salvarsan in lues, but little will be found con-

cerning the eradication of our old-time enemy malaria. I would not for a moment detract from the good work done toward the treatment of the diseases mentioned, but I do earnestly plead for the medical profession to awake from this state of lethargy concerning the elimination of a disease so easily eliminated as malaria. I venture to say that, if the same attention had been given this medical problem and it had received the publicity in the lay press these other diseases have, that the thousands of cases that occur annually in this great Southland of ours would have been materially reduced, the unenviable reputation that certain of our districts are hotbeds of disease would forever be banished, and that not only our malarial morbidity but that from all other causes would be very much less than under present conditions, and as Harris (34) stated in his address as Chairman of this section three years ago, "Prove that yellow fever and malaria are forever stamped from the South, and our prosperity will amaze the world."

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PERNICIOUS MALARIA WITH CEREBRAL SYMPTOMS, RESEMBLING HEAT STROKE, WITH REPORT OF CASES.*

By B. H. BOOTH, M.D.,
Drew, Miss.

In pernicious malaria of the comatose form the initial chill is usually absent and the first intimation of the attack is the development of acute delirium or sudden and deep coma.

The hot stage is commonly attended with very high fever, but the temperature in some cases is subnormal. The pupils are contracted, usually pin-point in character and fail to react to light. The tongue is coated, usually having a whitish fur on it. The odor of the breath is sweetish. The respirations are shallow and vary from 20 to 50 per minute, and may be even higher. All the secretions are diminished and there is usually a suppression of the urine. The surface of the body is generally cold and clammy and the pulse varies from 120 to 150 per minute. When the sweating stage sets in all the symptoms are ameliorated, but frequently there is no sweating stage and the patient dies.

Heat stroke is also usually ushered in by severe cerebral symptoms or deep coma. The temperature is usually high, but as in the comatose forms of malaria, the temperature may be subnormal. The pupils also are pin-point in character and fail to react to light. The tongue is coated with a whitish fur, the odor of the breath is sweetish, while the respirations are shallow and vary from 20 to 50 per minute. all the secretions are diminished and there is usually suppression of urine. The surface of the body, as in comatose malaria, may be either cold and clammy, or dry and hot. The pulse is usually about 150 per minute. To further complicate the diagnosis, both occur at the same season of the year, the hot weather, and under similar conditions.

With those considerations I wish to report a few cases to illustrate them.

Case I. Jim Mc—, negro, male, married, age 40, while ploughing in July fell unconscious and when I saw him shortly after, the pulse was 150, full and incompressible, respirations shallow and about 30 per minute. The pupils were pin-pointed and failed to react to light, the odor of the breath was sweetish, the surface of the body cold and clammy, the temperature in the axilla 97 2-5 F., abdomen full and boggy to the touch, liver and spleen apparently normal; there was such deep coma that he would not flinch from pin thrusts. As he had had an attack of malaria about a month previously, I diagnosed comatose malaria and treated him accordingly, with complete recovery. But this case was very peculiar to me, as he, on recovering from the coma, had an attack of dementia lasting about one week.

Case II. A county convict, negro, male, single, about 35 years of age, while hoeing in the field under a driver in August fell unconscious and had practically the same symptoms as the preceding case and under energetic anti-malarial treatment made an uneventful recovery.

Case III. P. M., negro, male, single, age 18, while working in the field in July complained of a severe headache and started to the house, but fell unconscious before reaching it. On arrival I found him in deep coma, with flushed face, full, incompressible pulse about 160 per minute, temperature in axilla 105 1-5 F. Respirations very shallow and about 40 per minute, liver and spleen apparently normal, abdomen full and boggy. There had been incontinence of urine, before I saw him, which was followed by a suppression which lasted about 30 hours. On reducing the temperature by means of cold water he recovered from the coma, but was wildly delir-

*Read before the Section on Medicine of the Southern Medical Association, Hattiesburg, Miss., November 12-14, 1911.

ious for nearly 24 hours. Under heroic anti-malarial treatment, with proper attention to the kidneys, he made a slow but complete recovery.

Case IV. E. A., negro, male, married, age 30, had been suffering with a severe headache for several days, every time he exposed himself to the hot sun. He came to my office one hot afternoon in July to consult me, and while I was getting the history of his symptoms he fell out of a chair onto the floor, unconscious. His skin was hot, dry and flushed, with small haemorrhagic patches over the body, pupils deeply contracted and failed to react to light, respirations shallow and fast, liver and spleen apparently normal, abdomen full and boggy. There was incontinence of urine, after which there was a suppression lasting about 24 hours. On reducing the temperature he soon became conscious and complained of an excruciating headache, which, despite all efforts to relieve it, continued until the suppression of urine lasting about 24 hours was relieved, when it promptly vanished. Under vigorous anti-malarial treatment he made an uneventful recovery.

DISCUSSION ON THE PAPERS OF DRS. HENSON AND BOOTH.

Dr. R. H. von Ezdorf, Mobile, Ala.—I did not expect to be called upon to open this discussion, as I am not prepared to discuss the different theories in regard to parthenogenesis or conjugation. I enjoyed hearing the paper very much, and particularly the points he brought out with regard to the two theories that have been advanced. As Dr. Henson stated, there were observations made in four cases in which points were advanced to negative the idea that parthenogenesis may have something to do with the recurrent cases of malaria. They were made in 1898 and 1899. I have observed in blood examinations forms which appeared to be conjugate forms, but which I interpreted as multiple infection. Again, I have observed cases where only the gametocytes have been present, and I have not been able to find a change of the gametocyte into some form which would be interpreted as reverting to the schizogonic cycle.

In making different examinations of the blood in the aestivo-autumnal cases, where the gametocytes were present, I have found that with the specific treatment of quinine the microgametocytes would disappear in a short time and the macrogametocytes would predominate.

Not long ago I made daily examinations of the blood in four cases in which I found as many as twenty-three macro and microgametocytes per 100 leucocytes. After the use of quinine in ten-grain doses, every four hours, the microgametocytes disappeared about the third day, although the macrogametocytes predominated. The macrogametocytes continued to predominate, although quinine treatment every four hours was kept up for over two weeks. At the end of ten days the macrogametocytes were found in the proportion of about one to two hundred leucocytes. All of my cases were kept under quinine treatment. With the macrogametocytes still present there were no febrile symptoms or in fact no symptoms whatever during the time the patient was recovering. In one case I have in mind I found that during the third week, when I discharged him, I told him to continue taking quinine, but at the end of a month, when he returned to the hospital, I found he had a temperature. I knew the man could not have gotten a reinfection, so the case must have been one in which parthenogenesis had taken place, so that he had a recurrence of his malarial fever. But it subsided under the use of quinine, and I found no macrogametocytes after the end of one week. It seemed to me that probably these macrogametocytes had reverted to the schizogonic cycle by parthenogenesis and encountering quinine were destroyed, so that in the destruction of the young parasites under treatment we had no formation of sporonts. All of my cases recovered as far as I could learn. In one particular case I had under observation for six months there was no recurrence of the malaria, though I found macrogametocytes.

With regard to the experiments that were made, it would appear that a small quantity of gametocytes had been introduced by the injection. I should like to ask the question, Is it not possible that in our cases of the relapsing type of malaria we have these gametocytes lodging in the bone marrow and in the spleen, remaining there in large numbers, and only a few of them reverting to the schizogonic cycle by parthenogenesis and in that way starting up a relapse, a condition not possible of simulation by injection of gametocytes?

I have had occasion to observe some of these cases for six or seven months and even for two years. I have in mind the case of an officer in the volunteer corps of the army who had recurrent attacks of malaria during these two years. How can these recur? The doctor says there must be persistent forms. Schaudinn believes in and reports having observed parthenogenesis. Certainly, so far as I have observed, the macrogametocytes apparently are a very resisting form, so that I feel ready to adhere to the parthenogenetic theory. We have seen that form and know it. So far as the conjugated form is concerned, we have not seen the flagellate merozoite in cases of malaria in man, and therefore we hesitate to accept this theory.

I agree with Dr. Henson that we are to continue and should continue to treat our cases of malaria over long periods of time. We know that the gametocytes are extremely persistent. Even if the macrogametocytes will revert to the schizogonic cycle by parthenogenesis, we should continue treatment with quinine, so that then the individual is always prepared to fight the young sporulating forms that develop within him and in that way avoid these recurrent attacks of malaria.

Dr. Louis Leroy, Memphis, Tenn.—I have not had

an opportunity to study the point of parthenogenesis or asexual reproduction, but the point of resting forms, such as the doctor mentioned, has occurred to me a number of times. At one time we had quite a number of patients coming from latitudes which were considered more malarious than our section, who had in many instances been free from any malarial attacks for a period varying from six months to several years, and very frequently—I was going to say invariably—after about a week in this district fresh outbreaks of malaria occurred. It was a matter of curiosity at the time because we had not done so much work as we have since in examining dozens or more specimens of blood. Having plenty of time to examine them quite thoroughly and failing in many instances beforehand to find any parasites whatever, yet inside of ten days or so apparently new attacks of malaria would be developed. Most of these cases would have enlargement of the spleen develop generally subsequently. Now, whether or not the spleen or bone marrow was the site of the resting parasites which under these changed conditions brought about, that I am not able to say, but at least that was my working hypothesis. I have also brought paroxysms in one case following X-ray exposures of a large spleen in which case again I was unable previously to find parasites in the blood. I might have been able to do so by the Ross thick film method.

Dr. J. B. McElroy, Memphis, Tenn.—It is manifestly impossible to discuss these two forms of malaria and the theories that have been advanced in five minutes. My impressions have all been gained from a study of the blood itself and from the literature, and they are directly in opposition to those of the essayist. I can see no evidence from a study of the blood of these conjugating forms developing in the body. On the other hand, we may say that parthenogenesis is a well established principle. No man of the genius of Schaudinn has yet appeared upon the scene in the study of protozoology.

I agree entirely with the gentleman who opened the discussion that these microgametocytes continue in the blood after the continued and heroic administration of quinine, and would further say that we should in all instances include in the diagnosis of malaria not only the presence of malarial parasites, and the varieties of them, but we should determine from examination of the blood whether we are dealing with a relapse, which is easily done by the presence of the macrogametocytes, both of the tertian and estivo-autumnal type.

As to the advantage of the Ross method, it is of great benefit in the establishment of the presence of the parasites when they cannot be found by the ordinary methods of examination. So far as my experience goes, I have found Roget's modification of the Ross method to be decidedly the best.

Dr. R. H. von Ezdorf, Mobile, Ala.—A point was made with regard to the technic. I had made a note of that which I wished to dwell on when I had the opportunity of speaking first, but did not do so.

With regard to the technic of blood examinations, I think we should all learn one technic and know it well. Once we recognize the parasites, we can follow that one technic and know what we are doing and what we are finding. In my experience in examining the blood, I feel a little hesitancy even yet in using the Ross method because of the reformed appearing parasites and the only thing I would say is this, that while it has been highly recommended I feel one should become very familiar with the ordinary spreads first before resorting to the Ross method exclusively.

Dr. Henson (closing the discussion)—I would like to say that the negative findings from a thin smear should not be relied on too much, as Ross has shown that it is necessary to put two billions in the main circulation before we have any manifestations to any extent. If we cut that down to five hundred million we may have no clinical manifestations, and yet by using a thin film, on a thin smear, it is hard indeed at times to find parasites. This is more especially true where one or two doses of quinine have been given. We all know what a disappointment it is when we have a case of malaria and ask a patient if he has taken quinine and we get the answer, "Yes."

The point brought out that it is necessary to be familiar with the parasites in a thin smear is well taken. It is very hard, and one has to work for some time before he can do so with advantage with the thick film.

I am disappointed in not being able to show you a photomicrograph in natural colors of the slide I prepared according to my modified technic using a thick film. In this particular slide the parasites were very few in the thin smear, having to examine as many as possible, ten or a dozen fields, before one could find a single parasite. With the thick film method, the same smear taken at the same time revealed from one to nine parasites which I had photographed. In transmitting the slide to New York my markings were lost which delayed the photographer from sending me the picture.

In regard to the treatment of the sexual forms of infection, especially the estivo-autumnal infection, it is unnecessary for me to say that I take the patient under treatment for two or four weeks. The treatment during that time must be vigorous. Many patients will object to taking thirty grains of quinine daily for a month. For those of you who may not have instituted such treatment I will say that the disagreeable features of the treatment disappear very largely after they have been under treatment for a week. In other words, while all the symptoms are very marked for the first week, under twenty or thirty grains of quinine, they largely disappear and the system accommodates itself to the vigorous use of such treatment.

Recently there have been in Tampa, confined in the new pest-house, three cases of smallpox, one man and two women. Last year there were in the different counties of this State—according to the last report (1911) of the Surgeon-General of the P. H. and Marine Hospital Service—3,155 cases of smallpox with a very small mortality.

Dr. A. M. Fernandez de Ybarra, of New York City, the well-known medical biographer of Christopher Columbus, is spending a few months at Tampa.

SOME SIDE LINES IN THE TROPICS.*

By ISADORE DYER, Ph.B., M.D.,
New Orleans, La.

No one who lives so near the borderland of exotic countries can help getting hungry now and then for a vista of the lands beyond the sea and with the sentimental glamour which the folk lore stories cast over these, the interest grows as the years go by.

We have had our travelers to bring home the accounts of the countries to the south of us for many years. Most of these were tales of hardship; now with the growth of a twentieth century progress, things are different.

Fifteen years ago Havana was a proverbial pest hole, Panama the mausoleum of French industry and the whole Central American coast and even as far north as Brownsville, Texas, was shunned during certain seasons as if a death warrant was a part of a passage contract.

The air of a modern salvation has blown over these lands until today the dangers are minimized and the prospect so changed that tourists are actually making excursions for pleasure and recreation to parts which formerly were visited under necessitous circumstances alone.

The commerce of the world carries with it the safeguards of its enterprises and much credit is due to some of our own people for their creation at the ports of call of the shipping from this port. We are soon to see the avenue of passage to the Western worlds opened for our benefit, and with such progress there mus tbe the disappearance of attending evils.

Havana stands exemplar of what sanitation means, and most of our American cities can take lessons in municipal cleanliness from this Antillean metropolis, now the much appreciated pleasure mart of the southern seas, with her broad *Malecon* stretching for miles along the great blue Gulf of Mexico, a driveway with no superior; her *Prado,* a glorious promenade, all environed by a Latinic people, loving the things of life which are set in a minor key. An entrepot as well, and cosmopolitan in its population first and in its customs also, so different in her richness of gentle courtesies from her older Continental prototypes.

And our Central American peoples carry, too, the instincts of the same original peoples, but, more remote from the avenues of travel, they have yet to grow into places of attraction for the traveler.

Panama in 1904 was hardly attractive. The solemn cathedral in the Central Square, the roosting vultures on almost every housetop and well nigh every tree, with every third shop a drug store dispensing quinine at a cent a grain, and doing large business at that, cast a burden of depression which was hard to lose. Then, the water carrier called at the house entrance and you were safer if you took bottled water, without ice, usually.

Culebra in those days resisted the little nibbles of the two or three steam ploughs at the sides of those great hills. The dinky little French cars would still run off the track, now and then, and Uncle Sam had not grown serious at the task of the Panama Canal. Our sanitarians had, however, and already waterworks were under way for Panama; Ancon had been revolutionized, and at Empire, Las Flores and Gatun the soldier boys slept safe behind screened windows and doors; yellow fever was still occasional and malaria a desperate enemy to the project in hand.

I am hungry for another vision soon, to pay tribute to the master geniuses who have conquered all, and more than anything else, have demonstrated that the pest holes may

*Read before the Orleans Parish Medical Society, May 27, 1912.

become pleasure resorts if only a proper use of intelligent application of sound principles prevails.

* * * *

There was a small colony of lepers under government supervision in 1904. I understand more cases have since occurred and have been segregated; not surprising when you consider that the people who have come to Panama have all parts of the globe as their homes.

Thirty years ago none of the English colonies in the Gulf and Caribbean was free of yaws, the frambesiform disease, and hospitals or lazarets prevailed for the care of this condition. Syphilis, leprosy and yaws were housed together in most places. Now this disease is rare, but every now and then some observant medico comes back from a few months' sojourn in the tropical countries to the south of us, describing some new disease. We have yet to know the life story of some of the exotic types, where names are even strange and with the various problems in fevers, malarial types and others, insect-borne diseases and those of local types, there is a field for our medical men as large as it is interesting.

Pinta, which is dismissed by the casual observer as a "sort of ringworm," still is a curious sort in its various colors; caraate, too, a disease of the French African colonies, but which is sometimes seen in our hemisphere. But the medical phases of the tropics have been touched on already and by better hands than mine. We are not yet awake, however, to the possibilities of all sorts of research, and the field grows more and more large.

What a world of endeavor opens when you think that from our own borders to the Andes there are landmarks of a civilization as old as history—emblems discovered, particularly in Guatemala and in Yucatan, which have led some imaginations to locate the Garden of Eden not far from Merida on the Yucatan peninsula, and the ruined temples with their Phallic and Phenician suggestions open up a speculation which lets the mind grow wild in anticipation of a field which has not yet given up all its treasures.

When Voltaire laid his El Dorado in this new country to the south of us, he only borrowed a phase of local legend for his own imaginative tale. The mysterious longing for the lost Atlantis has built about the stories of these peoples a thin fabric of history which is in its traditions three thousand and more years older than Moses and yet the story is untold.

If I have injected too much of froth into this evening of scientific discussion, you will pardon it, for I am so constituted that even if my every day work is only skin deep, I can yet dream that the labors of our coming children lie to the south and in more fields than ours, and if the borderland of science lies near the art of life, then we may be privileged to stop and pluck a few of the fragrant themes which mark the path of strenuous endeavor.

* * * *

Perhaps I may be forgiven for my excursion if I end this paper with a few more side lines related to practical suggestions.

The bath is growing to be a world fashion, but in the desire for cleanliness and comfort often the result is over-reached by too much washing in the tropics. The natives have suggested the remedy by anointing themselves, so the custom has come about to use fresh cocoanut oil after the bath to relieve the dryness of the skin. Incidentally, this procedure prevents and relieves the prickly heat, which because of its prevalence in hot lands is also called lichen tropicus. The heat of the feet is avoided by slipping in a piece of banana leaf, and this is even practiced here in New Orleans, in the summer months. Perhaps as much might be done by the simple procedure of keeping the feet dry with dusting powders.

The personal hygiene in the tropics is always a concomitant of a successful and pleasurable visit, and perhaps this may be best presented in aphoristic form.

FOR THE INTENDING TRAVELER TO THE TROPICS.

Be sure you are in good health.

See your dentist; diseases of the gums prevail in the tropics. Likewise visit the ophthalmologist; the tropical glare is trying on good eyes, obviously on bad ones.

Keep early hours for rising and retiring. Experience has proven that work is not best in the middle of the day. Exercise can, therefore, be better borne.

Fall and winter are the best seasons.

Scarlet underwear is suggested as serviceable against the chemical rays of the sun, and such is now made. Khaki cloth for clothes, or a similar color, helps to foil the heat. Hats may be worn a la mode, of cork with green lining, or the plantain or banana leaf may be used inside the ordinary summer straw.

Woolens of light weight are recommended both for underwear and footgear, as superior to linens or cotton, but this is yet debatable from the point of general comfort. The advantage in longer wear and less laundry may make woolen preferable.

Water must all be taken on suspicion. When bottled waters are not to be had, water should be boiled for drinking purposes, and, when possible, even for baths and other toilet uses.

Food should be regulated by the conditions found. The natives live on light diet and usually make the heavy meal the last of the day. It is a good rule that the diet should be regulated by the day's work or effort. Meat is scarce and therefore seldom eaten. Canned foods are a last resort and to be avoided when not necessitous.

Green vegetables are a frequent source of dysentery and should either be sterilized or well cooked before being eaten.

The advice is often given to avoid excess of iced drinks in the tropics; the advice is easy to follow, as ice is at a premium in most places and the habit of doing without it is easily acquired. The local means of cooling drinks in earthen vessels exposed to the circulating air is a welcome device and should be learned early.

The milk wagon in the tropics is frequently either the goat or the cow *in propria persona* and you draw your milk on the instant. The fertility of the goat in the tropics (especially in Cuba) makes this form of milk popular and the richness of the milk makes it desirable.

Alcohol and bad livers are mentioned in the same breath in the tropics and the practice of drinking stimulating beverages is limited to those too foolish to know or learn better and to those who have acquired a temperate habit in the matter.

The prevalence of mosquitoes always threatens malaria and a precautionary morning dose of quinine with another for a nightcap may prevent the full profit of the pernicious anophelines.

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Much besides might be said of what may or might be done in the tropics, but the anticipation of other new fields may lead some of my hearers to a like endeavor and we shall leave them here.

A PROGRAM FOR LOCAL AND STATE ORGANIZATION FOR THE SUPPRESSION OF TUBERCULOSIS.

Dr. J. W. Petit, of Ottawa, Ill., read before the A. M. A. Conference at Chicago, February, 1912, a thoughtful article embodying a scheme for organization by communities, towns and states for the suppression of tuberculosis. It considers the nature of infection, character of organizations needed, the style of buildings most suitable, the influence of climate, the length of time required for a cure, the kinds of cases most benefited, and many other plain, practical features of great interest to all engaged in fighting tuberculosis. It is worth while to all such to write to the author for a reprint.

The Journal regrets that circumstances prevent the presentation of a full synopsis of this timely and valuable paper.

A NEW TREATMENT OF PELLAGRA, WITH THE "ORGANO-MINERALIZED RADIO-ACTIVATED SERUM" OF DR. JEAN NICOLAIDI, PARIS, FRANCE.

By DR. JEAN NICOLAIDI,
Paris, France.

In the "Revista Pellagrologica Italiana" of November, 1911, the official pellagra paper of the Italian Government, Drs. Grillo and Maj publish the experiments made with the new treatment of Dr. Jean Nicolaidi, of Paris, consisting in a "organo-mineralized radio-activated serum."

Dr. Jean Nicolaidi, connected with the laboratory of the eminent Prof. R. Blanchard, of the faculty of Medecine of Paris, and former pupil of Londouzy and Widal, began his pellagra studies a few years ago at the instigation of his father physician in Roumania, where pellagra is widely developed (more than 80,000 cases), and in most grave form.

After a long study of the nutritive exchanges in pellagrins, and the troubles of the metabolism of the organic and mineral elements, Dr. Jean Nicolaidi recognized the utility of the two following indications:

1. Neutralization of the "toxine," or the "virus," which pellagra produces in the organism.

2. Awakening of the intimate intracellular activities and the reparative forces tending to remedy the deficits caused by the malady. For this purpose he adopted an "artificial organo-mineralized serum," which he rendered radio-active by a special process.

U. S. A.
Bulletin of the South Carolina Board of Health.
(Dr. J. J. Watson, Columbia.)

ROUMANIA.
Pellagrous Psychosis.
(Dr. Jean Nicolaidi.)

After long experiments in the study of the importance of each of the elements of the sero-plasma and the proportions in which it was best to utilize them, and after trying numerous processes with a view of insuring to the elements their maximum of activity, Dr.

Nicolaidi was able to unite all the elements extracted from the horse serum by evaporation in the vacuum, which he treated subsequently by means of a solution saturated with carbonic acid containing all the organic and mineral salts of the blood plasma.

In order to guarantee in the organism the best fixation of the elements and consequently the maximum utilization of its components, to render the serum more active and "vital," he adopted the plan of making it radio-active by a special process of great efficiency.

As a matter of fact, radio-activity is an essentially energetic form of therapy. Wickham (1) has demonstrated the bacteriocidic action of the alpha radium rays. These same rays should also serve as the principal energetic source, when it is proposed to raise diastasic force (2) which in the light of late discoveries play a part in all vital reactions of the organism. Radio-activity increases the activity of the tissues and of the beings. (3) Clinical experiences have verified the stimulating power of radio-active substances on the phenomena of elementary nutrition and on the vitality of the tissues. (4)

ITALY.

Pellagrous Psychosis.
("Pellagrosario" of Mogliano-Veneto.)

Nicolaidi undertook a great number of experiments on animals with aid of this serum and noticed by the urinary, foecal and blood examinations that the nutrition of the animals was found to be favorably influenced.

Many of these studies and experiments took place in Prof. R. Blanchard's parasitological laboratory at the faculty of medicine of Paris.

ROUMANIA.

Pellagrous Psychosis.
(Babes.)

Considering pellagra as a toxi-alimentary malady, Nicolaidi thought that he could make use of the data taken from experiments on

[1]Wickham: Annales de Dermatologie et de Syphiligraphie, Paris, 1906.
[2]Pozzi-Escot: Nature des Diastases, Paris, 1905.

animals, with the purpose to obtain: (1) The neutralization of the toxine accumulated in the organism; (2) an awakening of the activities of the intimate intracellular nutrition.

Thus, already in 1909, he began his experiments with his father in Roumania. The cases subjected to the serum treatment were all in a very bad state; they had been treated, without any result, in the classical way, with arsenic, iron, different tonics, etc., and were put, for a long time, under the best dietetic conditions.

The cures or rapid improvements obtained in a short time on these patients, on whom nothing could be obtained by the ordinary way, decided the Roumanian Government to appoint, in 1910, Dr. Jean Nicolaidi with an official mission for a new series of experiments which took place at the Preda Hospital in Craiova, under the control of Dr. Vernesco, the chief physician of the hospital.

The cases chosen for this new series of treatment were also all in very serious condition, with extremely pronounced cutaneous, gastro-enteric and nervous symptoms.

The result of the experiments made at the Preda Hospital in Craiova, during 1909 and 1910, were gathered in a report sent by Dr. Vernesco, to the general director of the Sanitary Service in Bucarest. In his conclusions Dr. Vernesco says:

"The improvement begins after a few injections, according to the gravity of the cases. Usually the digestive and nervous symptoms are those which commence to improve. Thus the diarrhea, agitation, nightmares and dizziness are calmed steadily and finally disappear. The imbecility disappears, the patients regain consciousness and become more active with improved spirits.

"The desquamation proceeds rapidly and usually in the following order: Beginning on the face and continuing on the chest, the body and the hands, terminating on the feet.

'The appetite steadily increases and becomes voracious in some cases, and the regular ration of the hospital is insufficient. The patients clamor for more food, the corporeal weight increases by 3 to 4 kilogrammes. A regeneration of the organism and a development of the psychic faculties are noted.

"According to the foregoing, my opinion is that the serum of Dr. Jean Nicolaidi is very

U. S. A.
Lesions on Hands and Face.
Pellagrous Psychosis.
Extreme Cachexy.
(Dr. Louis Leroy, Memphis.)

efficacious against pellagra. Thus, in several cases of pellagrous patients subjected, with the object of study, to the classic treatments with arsenic, tonics, etc., without any result, I obtained, in abandoning these treatments, a complete cure after a series of injections of this serum.

"To convince myself regarding the final results of the treatment, I requested a number of the mayors to inform me of the present condition of patients living in their respective

[5]Georges, Bohn: Revue des Idees, January, 1904.
[4]Curie et Laborde: Academie des Sciences de Paris, 1903.

communes and who had been cured by use of the serum. All those who replied informed me that the former patients were in perfect condition."

A certain number of patients afflicted with pellagrous psychosis were also treated with Nicolaidi's serum at the insane asylum of Craiova (Roumania) by Dr. Mileticiu, chief physician of the asylum.

U. S. A.
(Dr. Louis Leroy, Memphis.)

The patients subjected to the treatment were not afflicted with organic alterations of the central nervous system, but they presented extremely grave nervous symptoms, such as: complete imbecility, intense cachexy, extreme agitation, access of frenzy, incoherent lanfiuage, altering with a period of absolute dumbness, visual and auditory hallucinations, etc. After a certain number of injections (20 to 25) some of these patients were cured, some considerably improved, which has not been obtained by all the different treatments applied during months in the asylum.

The satisfactory results obtained during two years with Dr. Jean Nicolaidi's serum in Roumania brought to the knowledge of the Italian Government—Dr. Nicolaidi was officially appointed by it—to undertake experiments in Italy. These experiments took place last summer and autumn in the province of Udine, one of the most afflicted in Italy, and under the control of Prof. Antonini, director of the insane asylum of Udine and one of the most well known pellagrologists.

ROUMANIA.
Erythema and Pellagrous Psychosis.
(Babes.)

The cases chosen for these experiments were all in a most advanced state. In spite of all treatments tried during long months no

satisfactory result could be obtained on these patients, who were afflicted with grave gastro-enteric symptoms, as diarrhea (5 to 30 profuse, fetid stools per day), continual pyrosis, intense thirst and burning in mouth, swollen lips, appetite lacking, disordered taste, tongue void of epithelium, cracked lips, erosion of mucous membrane of gums, gastralgia, vomitings; with very marked nervous phenomena, as headache, vertigo, insomnia, buzzings, terrifying nightmares, extreme agitation, access of frenzy, mental depression akin to hypochondria, imbecility, incoherence of language alternating with period of absolute dumbness, visual and auditory hallucinations; with a very bad general status: miserable aspect, organic weakness and numerous ailments, general fatigue, impossibility to work and even to attend to housework, impossibility to stand alone, signs of premature senility, intense cachexy, etc. The cases have been subjected to Dr. Nicolaidi's serum treatment at the insane asylum of Udine, by Dr. Volpi-Ghirardini, subdirector of the asylum, and at Martignacco, near Udine, by Drs. Grillo and Maj. In their conclusions Drs. Grillo and Maj describe as follows the results of their experiments in the "Rivista Pellagrologica Italiana":

"All the patients treated with the organo-mineralized radio-active serum have shown a marked improvement in a short length of time, with the exception of a case of mixed intoxication (pellagra and alcohol), in which delirium tremens predominated, and another case with grave psychic phenomena.

"The most salient point and which impressed us was the regularizing of the intestinal evacuations in a very short time—after five or six injections.

"The state of the nutrition with all the patients was notably influenced by the cure, and at the same time as the reawakening of the nutrition was observed the return of the forces, to such an extent that most of the patients were able to resume their occupations, which they had long since abandoned.

"The subjective troubles (sensation of physical prostration, buzzings, vertigo, pyrosis, anxiety, etc., and the vaso-motor phenomena were either attenuated or abolished. The reflexes were not changed. The outside of the tongue was regenerated almost completely in the majority of cases."

Numerous urological analyses, made at the beginning and at the end of the therapeutic experiments, proved that the nutrition was found to be favorably influenced. It must also be noted that all these patients have been left, during the treatment, in the same dietetic conditions in which they were before the therapeutic experiments, nothing having been changed in their "modus vivendi."

Another series of successful therapeutic experiments with Dr. Nicolaidi's serum took place at the departmental insane asylum of Treviso, under the control of Dr. Zanon, director of the asylum.

Among the numerous cases treated by Dr. Nicolaidi's serum and published by Drs. Grillo and Maj, with full particulars, in the "Rivista Pellagrologica Italiana," we report the two following, in which the gastro-enterie and nervous symptoms were particularly grave:

Case VII.

Received Sept. 3, 1911. M. Agnese, woman, aged 31 years. Antecedents: Father died of tuberculosis; mother living and in poor health, not appearing to have suffered from pellagra; patient had typhoid fever seven years ago; has had pellagra two years ago, beginning with serious diarrhea rebellious to all treatment and lasting 80 days, and with sensation of general prostration. Last spring, recurrence of diarrhea, with desquamative erythema on back of hands, lack of appetite, pyrosis, vaso-motor troubles, vertigo, buzzings. Seven normal childbirths, five boys and two girls, of whom three are dead and four living, the latter being in good health. The youngest, six months old, nourished by the patient. Alimentation mainly of maize and insufficient aqueduct water. Treatment followed: astringents,

tonics; patient has been in a "sanitary home."

Present status: Cutaneous phenomena: traces of desquamative erythema on hands in process of cure; subcutaneous cellular tissues only slightly evident; organic wasting. Gastro-enteric symptoms: Pyrosis, lack of appetite, sensation of heaviness in epigastric, diarr-

ITALY.
Marked Gastro-Enteric Symptoms.
Case II. "Rivista Pellagrologica Italiana."
(Dr. Jean Nicolaidi.)

hea, 20 to 30 stools a day, abdominal walls insufficient, meteorism, tongue cracked. Respiratory organs: Examination negative. Circulatory organs: Heart sound weakened. Nervous symptoms: Constant headache, no sensorial troubles. Sight: Weakened since she has been ill. Hearing: Normal. Sleep: Insomnia, dreams, nightmares (terrifying), continual vertigo. Reflexes: Left knee exaggerated, pharyngeal abolished, right pupillary normal. Sensibility: Tactile hyperesthesia, muscular sense preserved, no trembling, gait normal. Genito-urinary organs: Amenorrhoea, because she is nursing. General condition: Paleness, denutrition, emaciation, marked organic wasting, absolute incapacity to work, tiring at least effort. Wassermann reaction negative. Weight, 50 kilos. September 5, first injection, 25 cc. in right buttock. A few vaso-motor phenomena, to which she is subject. Yesterday, 20 diarrhea stools. Today, at 7 in the morning, already had 3, liquid and fetid. Has had her diarrhea two months, with numerous stools day and night. September 7, second injection, 50 cc., left buttock; feels pains; does not feel the phenomena

AUSTRIA.
Desquamative Erythema.
(Merk.)

she felt during first injection. Yesterday, 12 to 14 stools (liquid). This morning before 7 o'clock, six stools; sleep agitated; appetite restricted, pyrosis, headache. September 9, third injection, 50 cc., right buttock; slight pain, disappearing in a few minutes. Day before yesterday, after the injection, five or six

more stools. Yesterday, 10 stools, liquid and fetid. This morning, before 7 o'clock, three stools. Very little appetite; all the phenomena observed continue. September 11, fourth injection, 50 cc., left buttock. Day before yesterday, five to seven liquid fetid stools. She thinks, however, there is some improvement as regards the diarrhea. September 13, fifth injection, 50 cc. Yesterday, seven liquid stools, still fetid. This morning before the injection, one stool; severe pain after the injection; declares she is better as regards the vaso-motor troubles, to which she is subject; strength also seems to increase. September 15, sixth injection, 50 cc. Yesterday she had two stools, today one, a little more consistent. Slight pain after the injection; no other local reaction; says she had some fever during the night, thereby somewhat fatigued. September 17, seventh injection, 50 cc. Yesterday one liquid stool; today another of same nature; some pain; has her menstruations since yesterday, about seven months since her delivery; appetite restricted; vertigo continues, though lessened; patient feels sensation of general improvement; legs are stronger; labor, however, fatigues her. September 18, eighth injection, 50 cc. Yesterday two stools, today one; more consistent. September 21, ninth injection, 50 cc. Yesterday two stools (nearly solid) today one. September 23, tenth injection, 50 cc. Slight pain, with irradiation along the member. Yesterday two pultaceous stools; today none, thus far. September 25, eleventh injection, 50 cc. Yesterday one stool (solid); today, one, well-formed, before the injection; patient feels exhausted; headache diminished; vaso-motor troubles disappeared. September 26, twelfth injection, 50 cc., in left; suffers from previous injections; severe gastralgia during last two days; normal stools since the 24th of this month. September 30, thirteenth injection, 25 cc., in left. Injection is incomplete because of hardening of tissues, which prevents liquid from penetrating and provoking insupportable pain; yesterday one stool, normal. The patient is contented because the diarrhea has ceased and she no longer has the sensation of prostration. Also improved as regards headaches and vaso-motor troubles; appetite and forces increased, but not to the point of resisting fatigue. October 2, fourteenth injection, 50 cc., in right; stools normal; appetite low; nutrition still insufficient. October 4, fifteenth injection, 50 cc., in right; intense pain; patient declares that since the beginning of the cure, her baby, which she is nursing, is much improved as regards general nutrition. The baby finds the maternal milk sufficient, which was not the case before the treatment. October 6, sixteenth injection in left; nursing discontinued during the last three days; marked improvement now as regards general condition, strength and appetite; vertigo practically disappeared; headache rare; disappearance of the usual vaso-motor troubles; stools continually normal; pain after the injections. October 8, seventeenth injection, 50 cc., in right; has suffered from previous injections and from that of today; thinks she has some fever; stools normal. October 10, eighteenth injection in left; has had a few momentary troubles are result of suspension of nursing; diuresis abundant. October 12, nineteenth injection in right; no pain; stools normal; feels general feeling improved; says that before the treatment her food tasted insipid and had to have great quantity of salt; her troubles now very much diminished, and she no longer craves salt in food; she declares also that the treatment has relieved her greatly from all her troubles; has desire to return to her work; can be busy all day without fatigue. October 14, twentieth injection, 50 cc., in left; stools still normal; appetite good; circulatory phenomena much improved; now drinks very little water, whereas she formerly suffered from intense thirst, which obliged her to drink, at night particularly, great quantities of water (she drank about a litre and a half in two draughts). The buzzings and fatigue have

ceased; forces increased; can walk without fatigue; nutrition is generally improved; weight, 51 kg. 200.

Case IX.

Received September 19, B. Giuseppe, a man aged 54 years. Antecedents: Unable to say exactly of what his parents died. A brother living has suffered from pellagra. Patient had bronchial pneumonia three years ago. First appearance of the malady and symptoms experienced thus far. Present malady began in June of last year with profuse diar-

ITALY.

Marked Nervous Symptoms.
Case V. "Rivista Pellagrol Italiana."
(Dr. Jean Nicolaidi.)

rhea (liquid and fetid); four to twenty stools per day. In spite of all treatments, diarrhea has never ceased. Some improvement, however, last winter as regards number of stools. Last spring recrudescence of the diarrhea, accompanied by erythema diffused and desquamative on back of hands. Thus far has had no permanent improvement from the numerous cures followed. Recently, in addition to the diarrhea, has suffered from loss of flesh, anemia, lessening of forces and a diffused oedema of the lower extremities. Also the face is somewhat swollen. On account of this pronounced oedema, been obliged to remain in bed a week recently.

Alimentation—Almost exclusively of maize; has eaten bread since last June; aqueduct water.

Treatment Followed—Astringents, disinfectants, opiates, climatic and reconstituant cures in mountains.

Present Status:

Cutaneous phenomena: The skin presents a shiny cicatricial aspect, with no trace of erythema.

Gastro-enteric: Diarrhea since last year (eight to ten stools a day, liquid and fetid); tongue "geographic;" belly meteoric; aplanchtroptosis.

Respiratory organs: Persistent cough for some time; nothing notable in lungs.

Circulatory organs: Cardiac pulsations, net, weakened.

Nervous symptoms: Headache at times; no sensorial troubles; no vertigo; sight weakened; conjunctives much injected; pupils equal, reacting well to light and to adaptation; sleep normal; hearing normal.

Reflexes: Right knee normal; left sluggish; right plantar, flexor type normal; pharingeal and conjunctival, normal.

Sensibility: Normal.

Oedema: In members; oedema diffused in face.

General condition: Color of skin and mucous membranes is of an extreme paleness; waxy and dried; face is swollen; been unable during past year to work in fields; weight, 62 kg.

September 20—First injection, 40 cc., in right buttock; experiences pain; yesterday six to eight liquid fetid stools; today, one previous to injection; patient feels flabby; profuse perspiration in night; intense thirst.

September 22—Second injection, 50 cc., in left; slight pain, disappearing a few minutes

after massage; day before yesterday, several liquid stools following the injection; yesterday, three stools, likewise liquid.

September 23—Third injection, 50 cc., in right; feels pain; yesterday, after injection, three liquid stools.

September 24—Fourth injection 50 cc., in left; slight pain, soon disappearing; yesterday, after injection, two stools, somewhat modified; one today before the injection; intense thirst; nocturnal perspiration; light appetite; dulled taste in mouth.

September 26—Fifth injection, 50 cc., in right; yesterday, two stools; one this morning before injection; patient thinks he feels better generally.

September 28—Sixth injection, 50 cc., in left; yesterday, four liquid stools; one this morning.

September 30—Seventh injection, 50 cc., in right; yesterday, three stools, somewhat more consistent; declares he feels better; diuresis much increased.

October 2—Eighth injection, 50 cc., in left; preceding injection produced pain more severe and of longer duration; region is infiltrated and painful; yesterday, three stools of better formation; one today; swelling of face nearly disappeared, giving patient aspect of leanness; oedema of members also notably decreased; waxy paleness of skin continues.

October 4—Ninth injection, 50 cc., in right; severe pain; day before yesterday, after injection, three stools; yesterday, two (pultaceous); today, one; use of hot water compresses has dispelled the infiltration of tissues.

October 6—Tenth injection, 50 cc., in left; day before yesterday, two stools; yesterday likewise; today, one; patient declares these are modified, being more consistent; diuresis continually increased; thirst diminished; oedema of members decreasing rapidly.

October 8—Eleventh injection, 50 cc., in right; day before yesterday, two consistent stools; yesterday, two of same nature; night sweats; feels much improved in general condition.

October 10—Injections suspended because of pain caused by preceding; infiltration of the region; peripheral oedema extending to lower extremities.

October 12—Twelfth injection, 50 cc., in left; pain, infiltration and oedema are diminished; during last three days, two pultaceous stools per day.

October 14—Thirteenth injection, 50 cc., in right; yesterday, two pultaceous stools; appetite excellent; diuresis abundant; night sweating diminished; improvement in sense of taste.

October 16—Fourteenth injection, 50 cc., in left dorsal region; no pain; yesterday, two stools (pultaceous).

October 18—Fifteenth injection, 50 cc., in right dorsal region; injections in this region are better supported; yesterday, two pultaceous stools; patient says that during last few

ITALY.

Extremely Grave Gastro-Enteric Symptoms (After the Cure)
Case IX. "Rivista Pellagrologica Italiana." (Dr. Jean Nicolaidi.)

days the stools, instead of following in close succession, are spaced at intervals of ten to twelve hours; there remains some oedema in members.

October 20—Sixteenth injection, 50 cc., in left thoracic region; light pain, which disappears with the massage.

October 22—Seventeenth injection, 50 cc., in right dorsal region; very little pain; yesterday, two stools (pultaceous); declares he feels very much improved; can work a little in the fields without too much fatigue.

October 24—Eighteenth injection, 50 cc., in left dorsal region; yesterday, two stools (pultaceous); diuresis abundant; thirst practically disappeared.

October 26—Nineteenth injection, 50 cc., in left dorsal region; very little pain, which disappears with massage; yesterday, three stools (pultaceous); oedema of members notably diminished; general improvement increases progressively.

October 26—Twentieth injection, 50 cc., in left thoracic region; pain insignificant; day before yesterday, one well-formed stool; yesterday, one somewhat less well formed, and another of the same nature in the evening.

November 4—After a few days of rest the patient is advised to submit to five more injections, to which he acceded willingly. Twenty-first injection, 50 cc., in right thoracic region; slight pain; two stools per day, at ten to twelve-hour intervals, and practically regularly formed; patient declares he feels his forces returned to the extent that he can attend to greater part of his regular work.

November 6—Twenty-second injection, 50 cc., in left thoracic region; slight pain.

November 11—Twenty-third injection, 50 cc.; general condition excellent; patient has resumed his normal occupations; feels no more fatigue as result of day's labors; oedema disappeared; general nutrition improved; weight, 64 kilos.

November 18—The patient reports to us that the benefit of the cure is sustained, with normal stools and no more oedema at all.

Prof. Antonini, appointed by the Italian government for the control of all these therapeutical experiments, gives his impression as follows in his introduction on Drs. Grillo's and Mays' work, published by the "Rivista Pellagrologica Italiana":

"It gives me pleasure to certify that the therapeutic treatment was accomplished with all the precautions and guaranties of sincerity and precision possible," and "that we have found the means of fighting against pellagra at the moment when energetic methods may be necessary."

The following confirmatory letter was sent to Dr. Jean Nicolaidi by the medical inspector of the Province of Udine:

ROYAL PREFECTURE OF UDINE.

Udine, November 20, 1911.

No. 15313, Div. III (Health). Subject: Pellagrous Cases Treated With the Organo-Mineralized Radio-Activated Serum of Dr. Nicolaidi.

To Dr. Jean Nicolaidi, Martignacco:

On the 5th of November, accompanied by Cav. Off. G. B. Cantaruitti, Secretary of the Interprovincial Pellagrologic Committee, and Prof. Ugo Soli, Director of the Governmental Laboratory of Udine, I had the pleasure of inspecting the nine grave cases of pellagra which you, together with Dr. Umberto Grillo, had treated by means of the organo-mineralized radio-activated serum.

The results obtained, which Dr. Grillo will publish soon in our "Pellagrologic Review," certainly could not have been more conclusive, and I join in the congratulations due to you for this remarkable discovery, which, without a doubt, will bring relief to the countries stricken with the endemic disease of pellagra.

I have the honor to remain, etc.,

DR. FRATINI.

Prof. R. Blanchard, of Paris, brought to the knowledge of the Academy of Medicine

of Paris Dr. Jean Nicolaidi's studies and the results of his two missions in Roumania and Italy.

In his lecture held at the Academy of Medicine, Prof. Blanchard, about the result of Dr. Nicolaidi's mission in Roumania, says: "The results obtained are most remarkable. The patients were cured or improved in a most notable manner. Passing myself in Craiova at the moment when the experiments were finished, I could effectively establish the considerable improvements obtained."

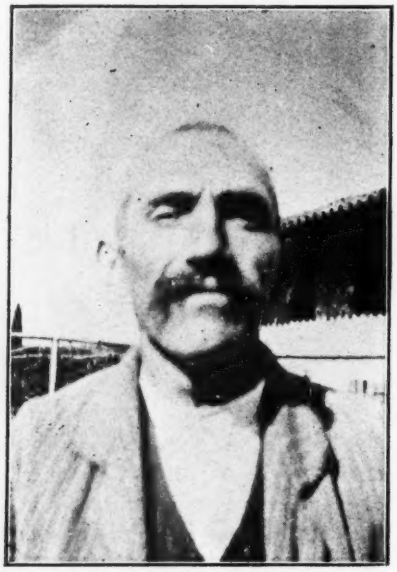
Concerning Dr. Nicolaidi's mission in Italy, Prof. Blanchard says: "The direction of the Italian Public Health Service made to Dr. Nicolaidi the best reception; through the prefects and fonctionners he was presented to Prof. Antonini, the eminent pellagrologist, director of the 'Manicomio' of Udine.

"Received at first with the geratest courtesy, but also with a certain skepticism, he noticed the attention gradually manifested by the physicians, then their interest, and at the end their satisfaction, as the cases, the most rebellious against all treatments, and until then the most incurable, chosen for testing best the efficiency of the treatment, improved from day to day until complete cure. The regularization of the intestinal evacuations was one of the most remarkable therapeutic results. Enteritis, rebellious since a long time ago against all treatments, with five to thirty diarrheic stools per day, were cured after ten to twelve injections."

Numerous are the American scientists who pointed out the wide spread of pellagra in these last years in the United States.

The papers read and the reports presented at the last National Conference on Pellagra held at Columbia, November, 1909, by Drs. C. H. Lavinder, P. A. Surgeon, United States Public Health and Marine Hospital Service, Washington; J. W. Babcock, Superintendent of the State Hospital, Columbia;

ITALY.
Marked Gastro-Enteric and Nervous Symptoms
(Before the Cure)
Case VII. "Rivista Pellagrol. Italiana."
(Dr. Jean Nicolaidi.)



ITALY.
Marked Nervous Symptoms.
Case I. "Rivista Pellagrolog. Italiana."
(Dr. Jean Nicolaidi.)

J. W. Kerr, U. S. P. H. and M. H. Service, Washington; C. F. Williams, Secretary of the State Board of Health, Columbia; George A. Zeller, Superintendent of State Hospital, Peoria; H. F. Harris, Secretary of State Board of Health, Atlanta; E. B. Saunders, State Hospital, Columbia; C. W. G. Rohrer,

ITALY.
Pellagrous Psychosis.
("Pellagrosario" of Mogliano-Veneto.)

Baltimore; C. C. Bass, New Orleans; J. W. Mobley, State Sanatorium, Milledgeville; Rea Parker, First Assistant Physician, Eastern State Hospital, Williamsburg, etc., recognized the necessity of a "further study of pellagra in the United States in order to preserve and protect the health of our people from a scourge that theratens to become national."

"Now we are face to face with the condition," says Dr. George A. Zeller. "We should meet it energetically, intelligently, and always with the feeling that we are menaced with a national scourge."

"Suddenly," says Dr. Rea Parker, "we found ourselves the vicitims of this dreadful malady, which has proven a veritable scourge to portions of Europe and other countries."

Concerning the relation of pellagra to insanity and certain nervous diseases, Dr. J. W. Mobley says: "The alienist looks back with regrets upon the mortality of this scourge in hospitals for the insane. He is made to reflect with deep concern for the future of his race when he observes the powerful impress of this disease upon the mind and nervous system. The general practitioner is not so much called upon to consider pellagra in its relation to insanity. On the alienist rests the moral duty of warning his people against an infection which, once firmly rooted, will manifest its baneful influence forever upon the human family."

"It is now established," says Dr. J. W. Babcock, "that pellagra in the United States extends from the Atlantic to the Pacific and from the Great Lakes to the Gulf of Mexico."

As this "national health problem" is of the greatest importance for the United States, we though it useful to give Dr. Jean Nicolaidi's above report.

CERTAIN ASPECTS OF THE PELLAGRA QUESTION.*

By C. H. LAVINDER, M.D.,
Passed Assistant Surgeon, United States Public Health and Marine Hospital Service,
Washington, D. C.

The late Surgeon-General of the service which I have the honor to represent, as well as his present successor, have felt and displayed much interest in the question of pellagra, and under their direction I have been given opportunities for the study of this disease. However well or ill I may have made use of such opportunities, I daily grow more convinced of the difficulties of the problem presented, and the broader my experience the more diffidence I feel in attempting to discuss a subject beset with so many uncertainties. I know I speak to an audience which has no little comprehension of this subject, and not a few of you, I dare say, are daily met by this perplexing disease. Instead, therefore, of trying to discuss any one particular phase of the matter, I wish rather to say a few words on several aspects of this question, feeling sure that I shall find a ready sympathy no matter what be the particular subject considered.

Etiology.—First in time and in importance comes of course the great question of etiology. What is the cause of pellagra? A question which at present cannot be answered in any definite and satisfactory manner. In spite of all the work which has been done and all the theories which have been presented, this subject still remains involved in doubt and obscurity. Very briefly it would seem now that the question to be resolved is whether pellagra shall be considered as a food-poisoning derived in some way from maize or whether it is a parasitic disease.

Among recent developments the hypothesis of Sambon that the disease is due possibly to some protozoal parasite transmitted by a blood-sucking insect—some one or more species of the genus *Simuliidae*—has met with a warm reception in the Unied States, but we should not forget that this hypothesis, however important it may be, remains still merely an hypothesis and awaits demonstration. The idea of Alessandrini that pellagra is due to a water-borne nematode worm of the family *Filaridae* likewise remains in the realm of hypothesis. In comment, a recent Italian writer somewhat sarcastically observes that perhaps Sambon's simulium may prove to be the intermediate host for Alessandrini's filaria, and so harmony will prevail. In estimating new ideas let us not forget that pellagra, while not hoary with antiquity, is yet no new disease. Men, and good men, have known and studied this malady for nearly two centuries. Can we reject as worthless the large and important record of all their work simply for a new hypothesis? Such a thing is in no wise characteristic of that safe—if indeed sometimes oversafe—conservatism which has always marked the medical profession of all times and all places. I do not believe we shall ever be so conservative as not to be open to new ideas, but on this question at least, under present conditions, we cannot safely assume any mental attitude except the judicial. The whole subject is still an open one, but the work done and the observations recorded deserve careful consideration.

Has pellagra any etiological relation with Indian corn? This to us, in the United States, and especially in the South, is a question of paramount importance. It is, like all the rest, a question which may not be answered with assurance, but there are some things which may be definitely said.

It has been shown, notably by Alsberg, that during the past few years the corn supply of the Southern States has been affected by new and different conditions. Once growing and

*An address delivered at Birmingham, Ala., before the State Medical Association, April 16-19, 1912.

consuming their own product, the South now is largely supplied with the corn of the Middle West. Agricultural conditions there also have undergone changes, and much corn is now perhaps grown so far north as to jeopardize its proper maturing. It is often harvested in an immature state, badly cared for and stored, and, in the absence of proper inspection laws, is frequently transported under unfavorable conditions. The grain is more or less subject to ready deterioration, and only too often reaches the South in a damaged state.

The result of such conditions and the bearing on public health are evident. The South is a large consumer of corn—how large I would not attempt to say, but I need not stop to tell you that corn in some form plays a large part in the dietary of the Southern States. Nor need I stop to discuss damaged corn as a food stuff. It admits no denial, I think, that such corn is not fit food for human consumption.

I do not believe we always realize, if indeed we know, how extensive is the sale and consumption, in the Southern States, of corn or corn products which have undergone deterioration. The State of South Carolina has apparently taken up this matter in earnest, and in a recent bulletin issued by Mr. E. J. Watson, Commissioner of Agriculture, Commerce and Industries in that State, you may read the following:

> South Carolina . . . was being flooded with rotten corn from the Middle and Northwestern States. The Department realizing this, at once began a rigid inspection of all corn shipped into the state, using the National Grain Dealers' grades to grade by and the Alsberg acidity test to test deterioration. From 60 to 75 per cent of the corn then placed on the market was unfit for feed in any shape, and was therefore condemned and seized by the Department. . . .
>
> Only a few months passed before the grain dealers began to realize that to ship spoiled corn into South Carolina meant to have it seized and confiscated. Today only from 5 to 15 per cent of the corn being inspected is condemned, when 75 to 80 per cent was condemned one year ago.

After disposing of the corn problem, an inquiry was made into the question of corn products, especially corn meal. The report continues:

> The corn was simply being ground into meal and sent into the state for human consumption instead of animal feed. . . . When the inspection first began about 95 to 99 per cent of meal shipped into South Carolina was found to be made from spoiled corn and was condemned. The grade of meal at once began to improve and at present only from 1 to 5 per cent of the meal shipped into this state is condemned.

Do you suppose that conditions in South Carolina differ very materially from those of many other Southern States? I think it may be very safely assumed that conditions such as were found existent in South Carolina are prevalent throughout the Southern States. Let then the etiological relation between spoiled corn and pellagra be what it may, at least we may safely say that spoiled corn is common in our Southern States, that it is not fit food for human consumption and that it should be eliminated. In our general fight for purer and better food stuffs why should we longer tolerate food of this character? Amidst our many perplexities and uncertainties this position appears to me an eminently safe and sound one to assume.

While then we seem to have made no great advance in the solution of the etiology of pellagra, yet I think we may at least take the credit of having greatly stimulated interest in the subject and of having created a sort of revival in research work upon the disease. In the enthusiasm of our efforts, however, we have not escaped criticism. Some of our literature has been marred by a profound indiffrence to, if not an absolute ignorance of the prodigious and important work done in this field by foreign observers. And the logical result of this is sometimes—indeed too often—seen in the desire to indulge in fantastic hypotheses and immature speculations which have no real basis in honest work. The foreign literature itself has not always escaped similar criticism. We should keep in mind the paradoxical properties of that spring of knowledge where "shallow draughts intoxicate the brain, and drinking largely sobers us

again." He who would offer new, and sometimes strange, hypotheses to account for this, or any other disease, should not forget that the burden of proof rests upon himself. Even should his hypothesis prove ultimately correct the credit for it will be given, and justly so, not to the creator of a barren hypothesis, but to the individual who by hard work makes it good. The gospel of the medical generation is work, and hypotheses unsupported by work are likely to be received, if not with impatience or disgust, yet with scant attention and respect. The field of pellagrous etiology, in the harsh language of a recent German author, has been "the playground of scientific fledglings, who, lacking any real comprehension of the fundamental relations of this question, with befuddled intellectual judgment, seek to force into etiological connection with pellagra all sorts of things from bald banalities to the most wonderful fantasies." This is more forceful than just, but it seems, in some manner, to indicate the intolerance of further speculation and hypothesis, and the desire now for something more satisfactory. Our present need is for information—information of an exact nature regarding all phases of pellagra. And we need more information which can be supplied by the general practitioner.

Just at present, especially in the United States, we are in urgent need of statistical and epidemiological data. No one is in a better position than the general practitioner to lend here a helping hand. In the matter of statistics we are ignorant as to how much pellagra exists in the United States today, although this serious disease is recognized as existent here now for five or six years. Most of the States seriously affected by this disease, I regret to say, do not belong to the registration area (and I commend this to your consideration) so that the National Government can give us little information. Among the States themselves the disease is not reportable except in five States, and in only one of these are such reports required by law (Washington, California, New York, Pennsylvania, Tennessee) (Trask). In the face of such difficulties we have been compelled to resort to very inaccurate estimates or guesses. Recently the Surgeon-General authorized me to collect statistics, and with this purpose in view there was prepared a franked return postcard, containing only a few questions, and these plain and simple ones. We started to mailing these cards to the individual practitioners in various States. Our results so far have certainly been discouraging. In one State, badly affected by pellagra, we mailed approximately 1,200 cards and received about 300 replies; in another 2,000 cards gave us nearly 500 replies. We have had similar experiences elsewhere. I thought at first perhaps those who did not reply simply had no cases to report, but a second card to a few men resulted in some replies which showed that it was simply neglect, and that there remained numerous unreported cases of the disease. I state all of this only in order to appeal to you for help. It is the general practitioner upon whom we must ultimately depend for statistics, and it is my earnest hope that he will not withhold such information.

The collection of statistics is not a mere matter of gathering useless information. Much depends upon accurate knowledge of this character. Chap has said, "The registration of vital statistics is the firm basis on which the whole structure of sanitary science and practice must rest. In order to learn the laws of disease, to devise remedies and to test them, we must have an approximately accurate knowledge of the movement of population and the causes of death."

Epidemiological data with regard to pellagra are likewise of great importance, and who can better supply us with such data than the general practitioner? Such facts as the geographic distribution of the disease, its topographic prevalence, effect of seasonal influences, relation to economic and hygienic surroundings, food and water supplies, age incidence, relation to sex, race, occupation, heredity—these and many others are at present

especially desired. Careful case histories and the collection of statistical data will bring to the writer far more lasting notice than vague and uncertain speculation as to the cause of the disease.

Diagnosis.—When we pass to the consideration of diagnosis, we find still uncertainties, but here we are on more satisfactory ground. The diagnosis of pellagra in well marked cases should offer no difficulty, but cases are numerous in which diagnosis is arrived at with no little difficulty. In the present state of the public mind one hesitates before making such a diagnosis unless one feels well assured. It is wiser in doubtful cases to await development. Pellagra is a disease of protean character and in its diagnosis we have no positive procedure for arriving at a conclusion. Dependence must be placed on the history and symptoms presented.

It is to be always kept in mind that the malady is essentially a disturbance of the central nervous system. The skin manifestations being so prominently in evidence, have always attracted great attention and have given the disease its name, but their great importance is in diagnosis, where they are of the utmost value. It may be well, therefore, to devote some time and attention to this striking manifestation of the disease and to analyze briefly this symptom. It is my experience that the characteristics peculiar to this lesion are not always given due weight. Largely following Merk, we may note the features described below:

1. Dermatologists are unanimously agreed, in the first place, that the pellagrous eruption is an erythema in the dermatologic sense of the word—an erythema comparable to erythema exudativum multiforme, or the erythema of lathyrism or ergotism, or of fagopyrismus.

2. This erythema, as a rule, appears suddenly—within a short time; and its genesis is not necessarily connected with such external things as atmospheric or solar influences. Not infrequently, however, its origin can be traced to various external influences, solar influences, application of various irritating substances or even pressure, as, for example, on elbows and knees. Recently I saw a young girl with a marked pellagrous erythema attributed by her to the previous application of some proprietary freckle lotion. Similar histories are not rare—the irritant apparently serving as the exciting cause of the eruption.

3. The erythema is peculiar and characteristic in its limitation, its edge ending in a typically marked red border, delimiting it sharply from the healthy skin beyond.

4. In its evolution it rather early develops a broad zone of scaling which is quite characteristic of the process. As a rule it does not reach its height for several days, and requires even a longer while in its retrogression, which ultimately occurs by first loss of the rosy border, then gradual fading of the center, while the scaling and crusting zone remains still longer the seat of the receding process. Exfoliation may take place with shedding of large areas of epidermis.

It is to be noted also that some cases show bullous formation with early loss of epidermis, leaving frequently extensive, raw, bleeding surfaces, which nearly always become subsequently infected. At times also during the receding process, ulcers and painful cracks and fissures may develop, and even rarely gangrenous processes may be seen.

5. One of the most striking characteristics of the eruption is its symmetry and its distribution. It is nearly always markedly symmetrical and shows certain places of predilection. These are the backs of the hands and of the feet, the face and the neck—those places most exposed to atmospheric influences. And the erythema will often display minor sharp limitations even in these places, depending upon slight protection from the sun's rays. Many descriptive appellations have been given to the various localizations of the erythema, such as "glove," "gauntlet," "boot," "neckband," "cravat," "mask," etc.

In addition to these sites of predilection the

erythema is often noted in other places. It is always wise to examine the extensor surfaces of elbows and knees and, in females, the external genitalia. The eruption may also appear asymmetrically at the axillary folds, perineal region and elsewhere. It may indeed occasionally be almost general.

6. The color scheme of the eruption is of great importance and possesses certain distinctive characteristics. On its first appearance it is usually a fairly bright red, almost like a sunburn, and the part is a little puffy. In a short time this color often takes on a sort of bluish, livid appearance, sometimes called plum color. Then, in the course of further changes, the whole passes to a reddish brown, or sepia, or bronze tint, which is very characteristic. In its retrogression it often leaves for a variable time a certain amount of pigmentation, which is frequently of aid in diagnosis. In the negro the color changes are of course less marked, but there is a peculiar sooty appearance quite characteristic.

7. Itching is usually absent and is never marked. The part burns and has a tense, uncomfortable feeling, but it does not show scratch marks.

8. Another characteristic is its seasonal appearance. The eruption as a rule appears but once annually—at spring time or occasionally in the fall. It may occur at both seasons in the same individual, but this is not usual.

9. With early attacks, the skin, after the disappearance of the erythema, resumes its usual appearance, but recurrences lead finally to thickening, followed later by atrophy, especially on the backs of the hands.

10. With erythema occur, of course, as a rule, the other symptoms of the affection and notwithstanding the importance of the skin lesions in diagnosis the associated symptoms should not, of course, be neglected. Cases may occur with only the skin eruption, and in Europe such cases among children are frequent.

This subject cannot be complete without a few words further on the diagnosis of pellagra without skin symptoms—*pellagra sine pellagra.* It is a matter of great doubt whether cases ever occur without skin lesions at some period of their evolution, and so Merk has used the term *pellagra "per aliquod tempus" sine pellagra.* It is no rare thing, however, to see cases presenting the clinical picture of the disease without any skin manifestations. The diagnosis of pellagra under such conditions is by no means certain, and must in many cases be only tentative.

In addition to *pellagra sine pellagra,* we have still another state to consider—a state seldom mentioned in the American literature, but often discussed in foreign literature. This is pseudo-pellagra. Time does not permit any general discussion, but it may be said that cases are not infrequently shown in the foreign clinics which present pellagrous symptoms and yet are called pseudo-pellagra. To me the distinction is by no means clear, but it is undoubtedly true that one does meet with cases —especially in alcoholics—in which the development of the disease is unusual and atypical. And the erythema also fails to display its usual characteristics. For the Italian school the discrimination of such cases depends largely on the history of the case with regard to the use of alcohol and the consumption of maize. They do not hesitate even to group cases of pellagra as "maidic," "ethylic" and "mixed"—all dependent upon the histories of the cases. This appears to me at present unjustifiable, but it is not to be forgotten that certain cases do give some warrant for the use of the term pseudo-pellagra. Such cases are not always easy of diagnosis.

Prognosis and Treatment.—In the prognosis and treatment of pellagra we again meet difficulties, but some of these are, I fear, of our own creation. The treatment of the disease is not always satisfactory, and the outlook is often unpromising. This, together with the great publicity given this disease in the secular press has, as you doubtless know, given rise to a widespread pellagraphobia, which in some places has reached almost the

stage of a panic. I sometimes fear that we medical men ourselves are not entirely blameless in the creation of such conditions. Patients ask, "Is there no cure for pellagra?" and we are compelled to say there is none. But this is not the whole story. True we have no specific remedy for the disease, but in how many diseases have we specific remedies? They may almost be counted on the fingers of one hand, and even some of these fail us at a pinch. We have no specific remedy for pellagra, but we do have a treatment for the disease and many men with large experience obtain good results from it. We have no specific remedy for typhoid fever, but we have a treatment and a good one, which, intelligently applied, yields excellent results.

I will not delay to discuss treatment, but some things, in passing, are worth brief mention. With Strambio we have, I believe, come to a realization that mere drugs have little effect on the progress of this disease. Despite sad lessons gained in the therapy of other ills, too often we remain shackld to a dead past and place in the potency of drugs a faith which experience has not justified. The evolution of the treatment of tuberculosis alone might have taught us better. I do not seek to decry drugs, only I would place upon them their true value and limitations.

Certainly in the treatment of pellagra so far drugs must take a secondary place. Among the essentials are rest, diet, hydrotherapy, fresh air, hygienic surroundings, careful attention—such things under the supervision of medical sympathy and intelligence offer the hope of far better results than drugs have yet achieved. Further, whatever be the cause of pellagra, the patient should receive the benefit of the doubt, and all corn products be rigidly eliminated from his dietary. Nor must we forget that pellagra is often a disease secondary to some other depressed or disordered state of the body. This primary condition demands attention. Let us also remember that the chronic nature of this affection invites complications. To find and treat these is important. In all treatment, by drugs or otherwise, let us use discretion, and "treat the patient, not the disease."

What place has surgery in the treatment of pellagra? In my judgment a limited one. Under exceptional circumstances direct transfusion of blood is doubtless of value. Had it, however, even more to offer, its limitations are too numerous to meet the requirements. Of other suggested surgical procedures little need be said. To me so far they represent rather a desire to do surgery than to treat pellagra.

Finally, I would lay emphasis on the necessity of prolonged medical supervision in these cases regardless of any apparent cure; and I would add a serious word of caution relative to the not infrequent mental depression with perhaps unsuspected suicidal tendencies. A little precaution may prevent a tragedy.

Prognosis, too, is often gloomy, but the doctor who, for his own selfish protection, holds out no hope even in desperate cases is—I speak in all kindness—unworthy of the profession to which he belongs. As Billroth once put it, "The patient comes to the physician for advice, consolation and hope; if you give him nothing, of this you may be an excellent diagnostician and prognosticator, but you are no doctor." I have seen many patients suffering from pellagra who were imbued with the idea that but two alternatives were left them—death or insanity. Surely this is no mental state for a sick person, and the doctor who helps to create such ideas in a patient's mind is guilty of a cruel wrong. A wise old doctor is reported as to have once urged the advisability of always making hopeful prognoses. "Deaths and accidents," he said, "are susceptible of an easy explanation, but recoveries, after fatal prognosis, live to shame one forever." This appears to be, within limits, sage advice. It seems to me our duty to do all in our power to counteract the pellagraphobia now so prevalent; and for the sake of the public to spare no effort to strip pellagra of the appearance of a "pestilence that walketh

in darkness" and a "destruction that wasteth at noonday."

But while it is our duty thus to dissemble to our patients, we cannot, and should not, conceal from ourselves the gravity of the situation confronting us. Here is a disease practically unknown to us a short time ago, which, in the brief space of five or six years, has been recognized in nearly all parts of our country, and which has, I believe, numbered not less than 20,000 victims with a case mortality certainly in excess of 25 per cent. It is a disease, moreover, which offers peculiar and perplexing difficulties. Sporadic here perhaps for a century, recently, and for unknown reasons, it has assumed an unwonted activity which shows no sign of abating. When consideration is given to the character of the disease; its continuous and rapid spread; its chronicity; its frequent distressing and painful manifestations; its termination at times in insanity; its grave form and high mortality; the class of people most affected; to the absence of any definite knowledge of its real nature and cause; to the fact that such knowledge as we do possess casts at least grave suspicion upon a valuable food product in general use; to the absence of any trustworthy prophylaxis; to the inefficacy of therapy; to the serious and widespread fear on the part of an aroused public—when these, and other minor things, are given due consideration this question rises to the dignity of a national problem demanding the most serious attention.

I would not feel myself a worthy member of my profession did I not look forward to the settlement of such a problem with confidence. But it is not a wise man who underestimates the foe he must meet. The question is one beset apparently with many grave difficulties and perplexities. I do not believe this field of endeavor offers to any one the opportunity of a single brilliant discovery which will cut the Gordian knot—this question is to be resolved by patient and laborious work probably on the part of many. Neusser long ago expressed the opinion that no mere pathologist or bacteriologist would be adequate to the problem presented, and sagely suggested the establishment of an international research institute with a large staff composed of special workers in many fields to attack the question from every side. A consummation as desirable as it is remote! Unless some generous philanthropist should become sufficiently interested in the disease to give the money necessary for work on a large scale, we must be content to continue as best we can. Let us hope that the time may not be far distant when our doubts may at least begin to resolve.

The younger Strambio, in his work on pellagra, has made the following felicitous summary of the whole matter: "Few diseases can dispute with pellagra the palm of having so effectually frustrated the acumen, the pertinacity and the devotion of medical men, be they research workers, pathologists or clinicians."

"Uncertain and subtle has been its appearance in each place now invaded; disputed its remote causes; obscure its pathological conditions; unknown its real essence; badly defined its anatomical lesions; certain only its refractoriness to every pharmaceutical aid; what man, possessed of sufficient knowledge for the broad comprehension of the many abstruse difficulties surrounding this disease, but still lacking the wisdom for resolving all of these obscurities and so believing himself confronted by an insoluble problem—when could such a man find himself brought to the point of justifying the inaction and apathy—for so many years obstructive alike to governments and peoples—which has looked on complacently at the ever-widening extension of this scourge in occidental Europe; or when could such a man ever regard as chimerical any real and earnest endeavor to liberate from such a disease fatherland and humanity?

Nevertheless, medical men, a tenacious and persistent breed, defying every weariness and every discouragement, not only stand firm at their posts but undismayed, struggle onward with the confident hope of even yet winning victory in the fight."

SOME INTESTINAL PARASITES OF NORTH MISSISSIPPI.

By DR. LOUIS KOHLHEIM,
Saltillo, Miss.

While engaged in a general practice in the counties of Lee, Prentiss and Union, in northeastern Mississippi, I have encountered during the last five years 382 cases of helminth infection, as follows:

Necator Americanus	314
Ascaris lumbricoides	21
Oxyuris vermicularis	15
Strongyloides intestinalis	6
Hymenolepis nana	24
Unidentified	1

These figures are of no statistical importance. They show merely the relative frequency with which these worms have been met with in the practice of an individual worker in a small area of this state. They also show that this same section, like many other southern districts, is heavily infected with "Stiles' disease."

It is interesting to note that ascaris, for which our mothers used to regularly "worm" us and which until recently was practically the only intestinal parasite known to the rural laity, is comparatively rare. Of the 21 cases collected, 12 were negroes. On the other hand, only two of my hookworm cases were colored patients, although I examined the feces of 100 of our native negroes for the purpose of determining the extent to which they are acting as carriers in my neighborhood. This investigation was inspired purely by curiosity and interest, and covered a period of almost two years. The negroes examined were selected indiscriminately from patients that had consulted me for maladies ranging anywhere from toothache to lacerated perineum. No end of subterfuge was required to induce them to bring in the specimens. The two cases mentioned represented heavy infections and presented the characteristic physical findings.

In addition to the helminthes enumerated above I have also demonstrated the presence of amoebic dysentery in my portion of the state.

The prevention of disease will ever remain the most glorious achievement of our art and it is toward this end that all the mighty resources of modern medicine are drifting. Much has already been accomplished—much more remains to be done.

The entomologists have taught us that it is necessary to know the life history of insect pests in order to protect vegetation against their ravages. This is equally true with regard to disease-producing parasites that afflict mankind. Fortunately worms are comparatively easy to study and the life histories of those mentioned in this paper have all been worked out so that in the light of present knowledge prophylaxis is so simple as to appear almost ridiculous.

Loos, Claude Smith, Bass and others have demonstrated that hookworm infection almost invariably takes place from soil polluted with human feces containing larvae. Bass says: "The worms penetrate the skin chiefly through the hair follicles and sweat pores, enter the blood stream, pass through the right heart to the lungs, into the bronchi, thence to the mouth and are swallowed, pass through the stomach to the small intestine where they attach themselves to the mucous membrane and develop to adult life."

The diagnosis of hookworm infection is made by finding the ova in the feces by means of the microscope. The physical signs that would cause one to suspect the disease, such as hookworm eye, hookworm heart, hookworm hair, belly or skin, are after all but the signs of an anemia with or without those findings which accompany malnutrition and digestive disturbances.

I believe that, so far as our practice is concerned, an anemia not otherwise fully accounted for should invariably suggest worms

and that our duty to the patient has not been discharged until they have been excluded by a careful and, if necessary, repeated examination of the feces.

Those who know most about hookworm agree that it is producing more deaths directly and indirectly and causing more poverty and wretchedness and inefficiency than any other malign influence in operation in our fair land today—but the fact that it gives rise to a moral degeneration in full keeping with the physical degeneration of its victims has never been sufficiently emphasized.

Everything considered, thymol seems to remain the best treatment in ridding a patient of this detestable parasite. It is important to keep giving it until the feces fail to show ova. In one instance I could find eggs after 14 rounds of the drug had been administered according to the directions of the Porto Rican Commission.

The Ascaris lumbricoides very much resembles the ordinary earth worm, but is more grayish than red. The male is from 5 to 8 inches in length and the female from 7 to 15 inches long. Dr. Stitt says: "The ova are very characteristic, with a rough mammiliated exterior. This at times is shelled off and we have a smooth egg which may be mistaken for eggs of other parasites. The eggs leave the body in the feces and after a long time —a few weeks to several months, according to temperature, develop an embryo which remains in the shell until swallowed by some man or animal." It is stated that they will remain alive for years. On being swallowed the embryo leaves the egg and we have males and females developing in the intestines.

This worm has excited the interest of physicians since time immemorial; it is referred to in the writings of Hippocrates. Osler says: "Their migrations are peculiar." But as far back as 1686 Lucus Tozzi "saw that and went him one better." Speaking of the ascarides he says: "They find their way into the heart and its pericardium, into the brain, the lungs, the veins and gall bladder, where they are difficult to catch." For some very interesting and curious facts in this connection see the articles of Drs. Fry and Cannady in the Journal A. M. A., Sept. 25, 1909.

Like all other intestinal worms, the lumbricoides give rise to no characteristic symptoms by which a diagnosis of their presence can be made. This is a point of very practical importance to remember, for of all substances used as an anthelmintic santonin is perhaps the most dangerous.

Potter's materia medica states that two grains killed a delicate child five years old.

I myself had the misfortune to witness the death, from its effects, of a little girl aged eight years. I do not know the quantity of the drug used. It was administered by the child's aunt, who made a diagnosis of worms because the little girl had laughed in her sleep. A post-mortem was refused. No worm was passed before death. However, I secured an ample specimen of feces. A painstaking search, to which I devoted many hours, failed to reveal an ovum of any kind.

Stitt says of the oxyuris vermicularis that "the male is about one-sixteenth of an inch long, and the female a little less than one-half an inch in length."

The eggs are thin-shelled, plano-convex, and show a coiled-up embryo. After the eggs are swallowed the adults develop in the small intestine, where mating takes place; the males then die. The fertilized females go to the coecum and colon, where they remain until they reach maturity. At this time the females wander to the rectum, where they either expel their ova or themselves, working their way out. This usually occurs at night and scratching induced by the itching causes the eggs to be widely spread about the parts. The worms may also wander into the vagina, urethra or under the prepuce. It will be seen as a result of the scratching the fingers become contaminated with ova, which may be carried to the mouth and so cause fresh infection.

The treatment for this parasite, given in many text books, frequently fails. The rea-

son is readily seen by remembering the life history, the early location in the small intestine and later in the large. Give santonin for the young adults in the small intestine and enemata for the gravid females in the rectum. Lime-water is excellent for the latter purpose.

Strongyloides intestinalis, formerly thought to be the cause of cochin-china diarrhoea, reproduces by parthenogenesis. There are two generations; first, the parasitical or intestinal form; second, the free living or fecal form. The intestinal form is represented only by females. These are about one-half of an inch long. Their eggs ordinarily hatch in the intestines and when the infection is severe the "rhabditiform embryos" can be found in the feces in great numbers. The ova never appear in the feces except during purgation or an active diarrhoea. They very much resemble hookworm eggs from which they are differentiated by being accompanied by the embryos and the fact that they measure about ten microns less in each diameter.

Outside the body the rhabditiform embryos develop into the free living or fecal form. Here there are males and females, which after mating produce rhabditiform larvae, which later change to filariform ones. These being swallowed in water or otherwise again start up the parasitical generation.

It has been demonstrated that also infection takes place through the skin.

In regard to treatment, the only first-hand knowledge I have on the subject is the fact that these parasites have seemed to fatten and thrive on all the various drugs that I have tried.

Hymenolepis nana is the smallest of the human tapeworms. It is from one-fourth to one-half inch in length and less than one-twenty-fifth of an inch in breadth. The eggs are quite characteristic of the species and are sometimes found in enormous numbers. Most of my patients looked like hookworm victims, due to the anemia.

Although this worm is very small, the number present may be very large, running into the thousands. A form found in rats, which is thought to be identical with this worm, does not require an intermediate host and is capable of reproducing succeeding generations in the intestine. Infection takes place by swallowing the eggs. The infection where found is likely to be present in several members of the same family.

Male fern is the only drug, so far as I am aware, that has any effect upon this parasite. I have used it with good results administered in ordinary capsules after the usual preparation of the patient as for hookworm treatment. The only difference is that I have been in the habit of dividing the total dose of the oleoresin half a drachm to one drachm into four equal parts and giving one of these every half hour, followed in two hours by a saline.

From what has been said of the life histories of these several intestinal parasites it will be seen that the prophylaxis is simplicity itself. *"Stop polluting the soil"* very nearly says the last word. The practical difficulties, however, in attaining this end are great. Our people will first have to be instructed and educated in this important matter. Those most needing instruction cannot be reached through literature. I have suggested as a "starter" that pressure be brought to bear on the proper authorities to have every school equipped with sanitary closets. Not only will this accomplish great good in checking the spread of infection among school children, and in introducing information on the subject into the homes where the children live, but will serve a greater purpose as an ever-present object lesson to the now growing generation of our citizens.

But while looking after sanitation and education let us keep in mind the advantage of medication in removing foci of infection. I have had to treat a large number of my hookworm patients gratuitously. Those needing treatment most are generally poor, ignorant and superstitious and much diplomacy is required in dealing with them, but when the

confidence of one of this class is gained he generally becomes a powerful factor in his little circle in inducing others to be examined and treated, thus unconsciously becoming a worker in a useful cause.

In closing, I desire to earnestly urge upon you never, under any circumstances, to yield to the temptation to treat a patient for "worms" until after the diagnosis has been positively made.

The different parasites require radically different treatment. No matter how plain the case may appear to be, remember that there is every chance to be mistaken. Let no man persuade you that a diagnosis can be made by simply inspecting the patient. His position is not tenable.

The eradication of the hookworm should not only appeal to our medical sense, but to our patriotism.

When I look about me as I journey along country roads and through villages and on every hand see hopelessness and helplessness written on the anemic faces of men, women and children, it is a source of pride to reflect that I am an humble representative of a noble calling into whose hands it has been given not only to lift those already smitten from their pitiable condition, but to so arrange that there need never be another case among succeeding generations of our fellows.

Away over somewhere in the Book of Joel we read: "And I will restore to you the years that the locust hath eaten, the canker-worm, and the caterpillar and the palmer-worm, my great army which I sent among you."

Dr. Stephen F. Hale, Mobile, Ala.—In an individual who has been suffering from hookworm disease for a period of fifteen or twenty years, certain lesions are formed in the intestinal canal which may persist after the individual is free of all hookworms, and I would like to ask the doctor whether these lesions in the intestinal canal are permanent, and, if so, what effect they have on the general economy?

While I am on the floor, I would like to say that the muddy-mindedness (mental stagnation) and physical inertia, such as is produced by the hookworm, is a serious menace to the community, because these individuals fill our jails and our poor houses. (Vagrancy is more than a habit—it is a disease.)

I regard the hookworm campaign at the present time as one of the greatest steps in preventive medicine that has been instituted in the history of medicine, and I think the men who have been pioneers along this line are worthy of laurel wreaths, worthy of a tribute, worthy of a monument, for they have indeed accomplished a noble work.

I am indebted to Dr. Stiles for the suggestion in regard to amenorrhea, because it is mighty hard to convince a patient that he or she has hookworm. Your diagnosis may be regarded as an insult,, and you may lose that patient's practice. Cure them first, and tell them afterwards, is a good slogan in the treatment of this disease.

I had the privilege and pleasure of seeing the first hookworm cases that were recognized in Mobile County, and it was a pitiful spectacle. I saw a little girl and a little boy with the disease. The little girl, who succumbed to the disease, died a miserable death. I remember the little boy, who was pale, anemic, and dropsical. One of his legs was very dropsical. It was enormously distended, and he had a blister form on it from which, I believe, fully two quarts of fluid were drawn. Six or eight months later I saw the same individual; he had taken hookworm treatment in the meantime. I was astonished to see a rosy-cheeked boy, with mind and body vigorous, and I said: This is truly a great transformation. It seemed as if some mighty magician had waved the wand of health over him, as he had become the healthy boy that God and nature intended he should be, and I said: He who discovered the treatment for hookworm is truly a man of accomplishments, a man of might. He is such a man as he who, in the classic allegory, ereeted a fence across the precipice rather than hospitals below the precipice to attend the poor unfortunates that fell over the brink, as had formerly been the case.

Dr. C. C. Bass, New Orleans, La.—I congratulate Dr. Kohlheim on his excellent and practical paper. I think he has covered the subject well.

There are two or three points in the paper that I desire to emphasize. I hesitate very much to disagree with my friend, Dr. Stiles, in his ability or anybody else's ability to diagnose hookworm infection by inspection. He may be able to diagnose hookworm disease in a severe case by inspection, but I question seriously whether there is any man living or who ever will live who can guess correctly, barring information other than that derived from the inspection of the patient, the presence of infection in one-half of the people who are infected. I do not believe that the diagnosis should be made by inspection when it is possible for it to be made otherwise, and I think Dr. Stiles will agree with me in regard to that. It is quite true, he can certainly in a hookworm infected district pick out the most severe hookworm cases, and in such instances be correct in his diagnosis.

With regard to the treatment of cestodes, or tapeworms of any sort, with thymol, I have had occasion to observe and to try thymol in a large number of tenia infections as well as other tapeworms. It has not been my impression that it is possible to cure many cases with thymol. I am quite sure that, so far as I have been able to observe, we cannot effect a cure with thymol.

Male fern, although not satisfactory in many respects, seems to be the best remedy that I have used.

Dr. Folkes has brought up an important idea which has been suggested to several of us before. Drs. Craig and Stiles have referred to it, namely, amebic infection in the South, but we do not hear so much of that infection in the North. I would call attention to an article which was published in the Journal of the American Medical Association November 4, 1911, in which W. E. Sistrunk announces the finding of a number of pathogenic ameba in Minnesota. One case is from Canada. There have also been reported a number of cases from Michigan and other Northern States. No doubt there is a great deal more of pathogenic amebic infection in the northern sections of the United States than we have heretofore been led to believe.

I want to call attention to a possible successful treatment of strongyloides infection. I have never seen any one cure a case but I can conceive of the possibility of curing it after this method. I had the pleasure of talking with Dr. Stiles and of getting his ideas along the same line yesterday. If strongyloides infection occurs through the skin, which has been demonstrated to be possible, and which to my mind is highly probable, and if it is also true that only the filariform strongyloides larvae can penetrate the skin, it seems to me that scrupulous cleanliness would be of greatest importance. An individual who is moderately cleanly in his habits, leaves enough feces on and around the anus after defecation to contain many microscopic larvae if he is already infected with strongyloides. Within a few hours these larvae, because of exposure to the air, become filariform, in which form they are infectious, and now penetrate the skin and pass through the usual channels as the hookworm larvae do, and reach the intestinal canal and perpetuate the infection.

If reinfection is prevented by extreme cleanliness after defecation it is probable the infection would finally die out. This would probably require several months or years. I have observed the following, which tends to confirm this theory: An individual infected with strongyloids, if he has a broken limb and is confined to bed where he has to use the bed pan, and is forced to lie with the feces and urine in contact with the skin for hours at a time, will, after a few weeks or even a few days, have strongyloides larvae in the sputum, and in a few weeks will have an enormous strongyloides infection. I believe I have seen at least two patients who were bedridden from some other disease, killed by overwhelming strongyloides infection in this manner.

Dr. Charles W. Stiles, Washington, D. C.—The essayist has brought out one or two interesting technical points that might well be considered from a zoological standpoint. He mentioned ascaris and referred to the fact that the ascaris lumbricoides of man might infect other animals.

From a zoological point of view, as our conception of generic and specific units have changed, we now are practically all in accord with the view that this large ascaris, which many authors have assumed to be the same in man as in hogs, cattle, and sheep, really represents four different species. A few years ago it would have been difficult to demonstrate that point. With the more modern technic and more careful study of the details of structure, I think we can now conclude that the ascaris of man does not occur in any domesticated animal, and that we are therefore not in danger of contracting the infection from these animals.

The doctor spoke of the moral side of hookworm disease; that is a phase of the subject upon which I have purposely remained very quiet. I have had so many troubles that I do not want to get into any more unnecessarily. But hookworm disease certainly has a moral side. This is particularly striking in certain localities, in certain "pockets" where the people have been infected for generations, we do find degenerated people, but I have not stressed that point so much as I have another point, namely, that given the condition of these people, it is surprising to me that they are as moral as they are.

A few days ago I was speaking before the faculty of one of the State Universities in the South, a coeducational university, and one of the members of the faculty brought up the subject of immorality among these people. I astounded him with my reply. It was this: "If you will go among the poorer white people of the South and pick out at random one hundred girls, and permit me to pick out at random one hundred girls who are students of this university, both being taken at random without any knowledge of local conditions, I will guarantee that you will not find a greater amount of morality in the one hundred college students I pick out than in the one hundred tenant white farm girls." (Applause.) I am seriously persuaded that that statement is absolutely correct. I am astonished to find the tremendous amount of morality among the very poor class of white people in the South, when we consider the conditions under which they are living, and the influences to which they are in many instances subjected. There are given localities or regions, however, where the reverse is true.

The doctor spoke of the difficulty of getting people under treatment for hookworm disease. I use a little trick sometimes. I must confess that I am out for results, and am ready to use a trick to get them. Very frequently I get hold of a family in which there are several girls, in some of whom there is irregularity in menstruation. If there is any one thing that appeals to the mother, it is the menses of her daughters. Well, I say nothing about hookworm, but I treat them for amenorrhea, and after the amenorrhea is all fixed, I tell the mother that the boys have the same infection, and unless they are treated they will reinfect the girls. If she is not clear as to the explanation I explain that what troubled the girls was nothing but hookworm disease.

The doctor brought up a serious matter with reference to strongyloides infection, and said we are not in a position to treat it medically. I have seen a number of cases said to be cured, but a month or so later the infection was still present. There is a little clew at the present time, which, if followed out, may possibly give results. I refer to the use of sulphur. The matter has not been carried far enough to justify a conclusion, but the use of flowers of sulphur in these cases is worthy of trial.

As to the dwarf tapeworm of man we have assumed that it is identical with a tapeworm which occurs in the rat. From the experiments made by Loos in Egypt and by myself in Washington, it looks as if the worm in man is simliar to that found in rats, but really not identical with the latter. The indications at present are that we do not obtain the

infection from the rate, and that the form in man is distinct from that in rats.

As for the treatment, three months ago I would have agreed with the statement of Dr. Kohlheim with reference to the use of male fern; but I am glad to say we seem to have another drug for this infection, and that is one we use in connection with hookworm treatment. I have been working on tapeworm infections this summer, and the hookworm treatment—thymol and epsom salts—seems to be good for the dwarf tapeworm. Out of five cases treated, two were cured with a single dose.

I am sorry that I have to take issue with both the reader of the paper and with Dr. Craig in regard to the point that it is necessary to confirm the diagnosis of cases of intestinal infection by the use of the microscope. I agree with them entirely when it comes to tapeworm infection; I agree that we will make some errors in regard to ascaris; but in the regular hookworm areas, where infection is severe, I do not hesitate to say that I do not attempt to confirm one-quarter of my diagnoses of uncinariasis with the microscope. Occasionally I am in error, but it is on the safe side. No harm is done. Furthermore, we must recall that we are dealing with people not all of whom are acustomed to giving stools for microscopic examination. For instance, you are somewhere in the mountains, and if you wait for a microscopic examination, an entire family may go without treatment. You may leave the children to die if you stand on the position that you must make a microscopic examination. I have unhesitatingly taken my chances time and again, and I have not yet had any bad results.

As to the importance of distinguishing between the different species of parasites present, it is very essential to distinguish between infection with the beef-tapeworm and the pork tapeworm—taenia solium and taenia saginata—from the standpoint of treatment. If a patient has the beef-tapeworm, you can allow the treatment to go for six months or a year. On the other hand, if he has the pork-tapeworm, one must lose not a single day in treatment. I feel that with infection with taenia solium we are justified in taking risks, if necessary, even in cases of pregnancy.

As for the campaign in general education along this line, I agree with everything that has been said and would go one step farther: I believe we are coming to the time when we have the unteachable parasite-carrier the same as we have the unteachable consumptive. The consumptive today, who knows he has consumption, in some cases goes around expectorating promiscuously. We shall have in the future, as we have today, the parasite-carrier who goes around and pollutes the soil promiscuously, not only among negroes, but among whites also. I am thoroughly persuaded that the time is coming when we shall have to teach the whites the danger of soil pollution and when we shall have to borrow the chain gang in order to teach the remaining unteachable whites and the majority of the negroes.

Dr. Kohlheim (closing)—There was one point in my paper which I regret was not emphasized more in the discussion, and that is the importance of stopping polluting the soil.

In reply to Dr. Craig, I cannot answer his question offhand, but I am sure I have seen perhaps eighteen cases of pathogenic amebiasis in my neighborhood. Until lately I did not know there were more than two of these parasites, the ameba histolytica and the ameba coli. Where I found an ameba that was phagocytic for the red blood cell, that was nimble-footed and associated with symptoms, I decided it was the ameba histolytica. Where the amebae were not phagocytic and of lower or slower motion, I decided they were the amebae coli and were harmless.

Dr. Stiles told us yesterday that there are twelve varieties. Dr. Craig has recently produced a book on the subject. I have not had time to read it.

So far as thymol in the treatment of the dwarf tapeworm is concerned, I have had in my practice, at least, two cases of mixed infection where both the hookworm and dwarf tapeworm were present, and as I considered hookworm the worst I gave the thymol first. I am sure, in those two cases, after several doses of thymol, I could not discover any diminution in the number of ova of the dwarf tapeworm. On the other hand, the male fern is a most excellent hookworm treatment.

I wish to thank the gentlemen very much for their kindly discussion of my paper. There is only one other point that remains, and that is in reference to the moral degeneration of hookworm victims. It is their slovenliness and their general cussedness to which I refer. There are other ways by which people may degenerate morally than in sacrificing their manhood. I am not surprised at the findings of Dr. Stiles when we remember that many of the Southern poor whites have some of the purest Anglo-Saxon blood on earth, and when we remember that in connection with the fact that these people are Southern women the explanation is easy.

SIMPLE METHODS OF DIFFERENTIATING DISEASE-BEARING INSECTS.*

C. S. LUDLOW,
Washington, D. C.

It is the purpose of this paper to present some points of difference in insects, of interest from the medical standpoint, and through them to offer some short cuts to their determination. The considerations which I shall present are elementary, and, in the *Diptera*,

*Read at the ninth annual meeting of the American Society of Tropical Medicine held in Atlantic City, June 3, 1912. Pubished by permission of the Surgeon-General, U. S. Army.

are recognized by entomologists as of great value in differentiating groups, my especial reason for selecting them being the ease with which they are recognized.

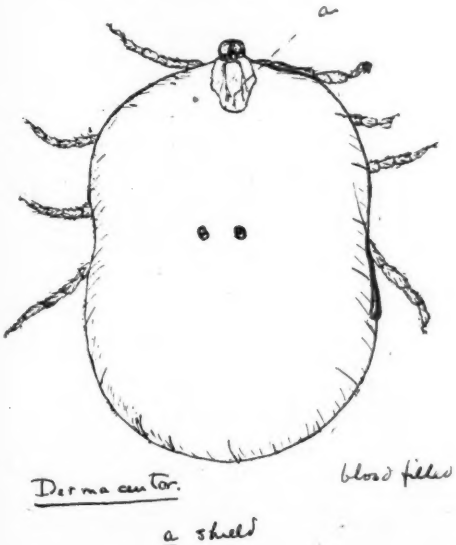
Among the *Arthropoda* which are to be considered in this paper are one order of the Class *Arachnidae* and four orders of the Class *Hexapoda* (true insects), of which the *Diptera* give by far the greater number of forms connected with the transmission of disease.

The *Diptera* will be considered as a group, but the other four forms will be compared in twos, in reference to their general resemblance, and with no regard for their entomological relationships.

Class. *Arachnidae.*

Easily differentiated from the *Hexapoda* in having four pairs of legs.

Order *Acarina* (ticks).



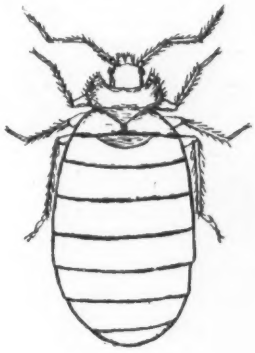
Under this order are three genera, proved, or supposed, to be connected with the transmission of relapsing fever and yaws.

Brown, oval or roundish animals, in which the thoracic parts and abdomen are fused to make one sack-like, easily distendable body.

There are two groups, those having a shield covering part, in the female, or, in the male, nearly the whole of the body, and those without this shield. Unfortunately this difference is of no help to medical workers, for *Dermacentor venustus* and *Dermacentor modestus,* the carriers of rocky mountain fever, have the shield, while Ornithodorus monbata, connected with African relapsing fever, and "the bordered *Argas,*" an undetermined species suspected of carrying yaws, are without the shield.

The sack-like body is distinctive of the tick in comparing it with the form most easily mistaken for it, the bedbug, for the latter has head, thoracic parts and abdomen, and the abdomen is distinctly segmented, the segments perhaps more clearly seen on the ventral aspect.

Class. *Hexapoda.* Order *Hemiptera.* Genus. *Cimex* (bedbugs).



Cimex lectularis.
(after marlatt)

Two species are of interest as disease-bearers, *Cimex lectularius,* distributed throughout the north temperate zone, the carrier of European relapsing fever, and *Cimex rotundatus,* a tropical or sub-tropical form, found in Porto Rico, Sierra Leon and St. Vincent, as well as in India, Malay, Aden, etc., connected with the transmission of kala-azar and probably leprosy.

The most readily seen differences between these two species are (a) the greater length

of the abdomen in *lectularius, rotundatus* being much the rounder ; (b) the cephalad margin of the thoracic parts, that of *Lectularius* being more markedly in-cut, so that the head is more enclosed by it and (c) the angular-shape of the last abdominal segment of *Rotundatus*. The next forms to be considered are lice and fleas.

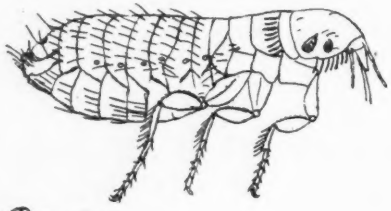
Both are small, grey, swift-moving, wingless insects, the former compressed dorso-ventrally, and the latter compressed laterally.

Order. *Hemiptera.* Genus. *Pediculus* (lice).

Pediculus capitis
(after Howard)

The differentiation of species is probably most easily made, so far as those species usually found on mankind are concerned, by the locality on the host.

Pediculus capitis has lately been proven connected with typhus.



Pulex felis.
(after Banks)

P. vestimenti is said to be one means of transmitting relapsing fever, and possibly leprosy.

Comparing the fleas with the *Pediculi* we find the lateral compression and method of movement of the former distinctive.

Order. *Siphonaptera* (fleas).

All fleas were formerly included in *Pulex*, but are now divided into several families and genera. Of these only a few are known or suspected of being transmitters of plague.

Giles published, some time since, a table for the placing of these insects. which will probably answer our general purpose.

1. Obvious eyes
   - a. Both inferior border of head and hind border of prothorax serrated; eight *serrations to lower border of head; prothorax with eight serrations on either side; tarsal claws of moderate size, but stout. *Pulex felis.*
   - b. Lower border of head unarmed, but prothorax serrated. Prothoracic collar with ten serrations on either side; tarsal claws small and delicate; profile of head curves down much more sharply to the vertical than in preceding or following species. *Ceratophyllus fasciatus.*
   - c. Neither inferior border of head or the prothorax serrated. Tarsal claws short and delicate, antipygideal bristles short. *Loemopsylla cheopis.* Tarsal claws long and scythe-like, antipygideal bristles short. *Pulex irritans.*
2. "Blind species."
   - a. Inferior border of head and the prothorax alike serrated. Inferior border of head with 4, and posterior border of prothorax with 11 serrations; tarsal claws small and delicate. *Ctenopsylla musculi.*

This table is, of course, intended to cover only those species likely to be connected with disease. Another table equally valuable will be found in "The Rat and Its Relation to the Public Health."

The *Diptera*, which, so far as is known, is the most important order in the transmission of disease, comes next, and here is found a means of differentiation so interesting and easily recognized, and so much more simple than the methods usually used, that it has seemed worth while to present it for your consideration. It is the wing venation.

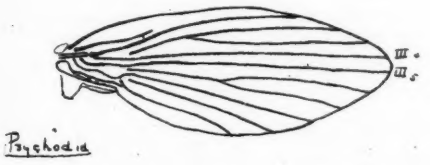
Professor J . H. Comstock, of Cornell University, was the first to show the evolution of the wing and that the development from the simple wing venation to the more complex venation ran parallel with the changes in antennae, palpi, ocelli, etc., on which the dif-

ferentiation and classification of the various families of flies had been made. As a basis from which to work, Professor Comstock takes a rationally supposable wing of an immature form, in which all the veins and all their branches are present, and through the coalescence and change of direction of some of them, shows how the intricate specialized forms arose.

The wing venation becomes, therefore, to a certain point, a means of classification; it is distinctive of the group to which the fly belongs; it always indicates the family, so there need never be any question as to whether a given specimen belongs to the *Psychodids*, the *Simulids*, the *Culicids*, the *Tabanids*, or the *Muscids*, and in some cases it even shows definitely the genus to which the species belongs.

The advantage this method has is that it gives differences easily and clearly seen and understood, and requires so little effort of memory that it makes the recognition of at least the group available to every one.

Order *Diptera* (flies).



The *Psychodidae* (moth-winged flies) have wings of a very simple type.

The veins are very straight, two are forked, but in spite of that the effect is of straight lines; vein III4 and III5 have not coalesced as in the mosquito wing, and both veins begin at the base of the wing. The veins are covered with hair-like scales, which give the wing the "moth-like" appearance.

Genus. *Phlebotomus.*

The wing is a little longer, relatively, than in the *Psychodid* wing figured, but the venation is practically the same.

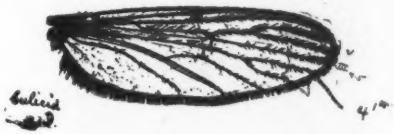
*The word "serrations" does not well describe the tenidia which are spike-like bodies standing free from the edge.

P. papatasii carries "papataci fever," and it is possible that later experiments will prove it connected with other diseases. It is a very small insect, easily escaping notice, and where it is to be excluded, in studies in the transmission of disease, great care, some ingenuity and nets of extremely small mesh will be required, as it passes easily through the usual mosquito net. It will be most easily confused with the *Corethrinae*, because the Culicid wing venation is somewhat similar, and the long hair-like wing scales are common to both *Corethrinae* and *Psychodidae*.

Family. *Culicidae* (mosquitoes).

A family that probably gives us more known hosts than any other of the *Hexapoda*.

The wing venation suggests that of the *Psychoda*, but is a little more intricate, and except in the sub-family *Corethrinae* the veins are covered with flattened scales.



The fork cells are nearer the apex of the wing, and the veins III4 and III5 have coalesced to form what is usually called the "third longitudinal vein," which does not begin at the root of the wing. These are characteristic changes, and the apical half of the wing is distinctive of the *Culicidae*.

There are several sub-families, of which only two, the *Anophelae* and the *Culicinae*, have any definite value in connection with disease. These sub-families may easily be confused unless the differentiation of sex be clearly made, which is usually readily done by differences in the antennae; those of the male are plumose, bushy, or "woolly," while those of the female are "thread-like." Curiously enough these differences seem much more readily observed by the untrained worker in an illustration than in the insect itself, so that one who easily recognizes these points in

a photograph or drawing often fails to distinguish the male from the female when studying the insects.

Before entering further into this subject it is necessary to say that the systematic work in this family is in great confusion, and there are many conflicting opinions as to the basis for classification. I use Theobald's classification, if for no better reason because it is the only one hitherto that covers and puts into any kind of system the mosquitoes of the tropics as well as those of the temperate zone.

The Anophelines include all the species known to be hosts for the malarial parasite.

The females are separated from all others by their long palpi, which are about as long as the proboscis. Here the value of the sex determination is worth attention, for if the antennae are neglected it is quite easy to mistake a female Anopheline for a male having unplumed palpi, an error which may cause some chagrin.

The disease-bearing *Anophelines* are easily grouped by the wing markings, and sometimes this characteristic is also specific.

Myzomyia funesta Giles is practically recognized in this way, *Nyssorhynchus fuliginosus* Giles can always be distinguished by its wing.

The group *Myzomyia Rossii, M. Ludlowii* and *M. indefinita,* on the contrary, have wings so alike that other points must be taken to separate them. Possibly this is the cause for some confusion which surrounds *Ludlowii.* Whether this species breeds in salt water or not, it surely breeds in fresh water, for the specimens on which the species was founded were taken in a mountainous country, where brackish water is not found. There is possibly a fourth species to be reckoned with.

The wings of the *sinensis* group are also not safe for differentiation of species and other points must usually be added.

In America the wing markings will for the most part be indicative, but *maculipennis* may be confused with a western *Culicine,* and *Franciscanus,* which, it seems likely, is carrying malaria in the very western south, is easily confused with *punctipennis,* its most easily seen difference being its spotted wing fringe. In Cuba and the Canal Zone the wings of the two forms are fairly distinct and the leg markings are characteristic in each case.

The *Culicinae* give only three forms of especial interest.

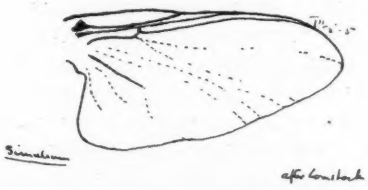
Stegomyia calopus, easily recognized by its thoracic markings, which are, practically, a silver "Jew's harp." Some discussion has arisen as to the specific value of the fine median lines; they are, however, of little moment to us, as no record has been made of these small differences in the work on yellow fever, and the chances are that all these forms carry the disease.

Culex fatigans, a practically unmarked mosquito, is common in all warm countries, and in the United States has a very indefinite

distribution, our variable seasons sometimes bringing it far north of its usual habitat. It is separated from *C. pipiens,* the northern form, by the relative length of the cell and stem of the first sub-marginal cell. It is claimed by some authorities that the American form is a different species, but as it is one of the most easily transportable species it is hard to draw any line between a possible native and the imported form.

Mansonia uniformis, a carrier of filariasis in Africa, is a large brown mosquito with speckled wings; the wing scales are of a peculiar "bracket" shape not found in any other genus. It is a fierce biter, and even where not proven a disease-carrier, as in the Philippine Islands, is a serious pest on account of its numbers and ferocity.

Before leaving the *Culicidae* I would like to call attention to the shyness of the *Anophelinæ* and to emphasize strongly the almost self-evident fact that failure in taking members of this sub-family by no means indicates that it is not present. If malaria be present and anophelines are not taken, it is not their absence but the lack of skill and pertinacity of the collector that is at fault. In one of the army posts it took careful collections three or four times a day for over two months to



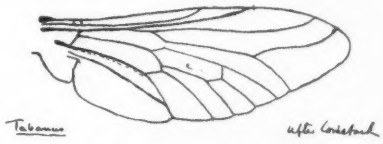
prove the presence of *maculipennis,* although it had been indicated by constantly occurring cases of malaria for a year previous.

The *Simulidae* (black flies) have only comparatively lately been considered in connection with disease.

The wing venation of *Simulium* is distinctive, more than half of the veins having coalesced so that veins III2-5 appear as one, the following veins being so weakened as to be little more than folds. It has gained its prominence as a possible disease-bearer mostly by Sambon's work in the investigation of pellagra.

Tabanidae (horse flies).

The wing venation of this group is markedly more specialized than those previously con-

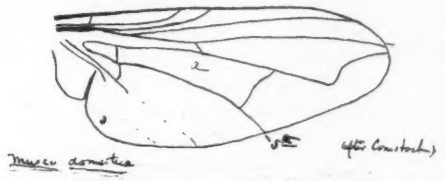


sidered, and is perhaps most easily recognized by the wide-open mouth of the apical cell. It will be well to look a moment at the discal cell, not because of its value here, but for comparison with another fly later.

This family has not usually been thought of as a pest for mankind, but some species undoubtedly attack man, and Austen believes that as they carry some disease of other animals, especially in tropical countries, they may be proven dangerous to men also.

Muscidae.

Under this family there are three genera of great interest.



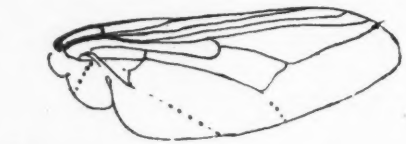
Musca domestica—In this wing the apical cell is nearly closed and the discal cell is large. The fifth longitudinal vein extends to the wing nearby. There are several flies easily mistaken for this, the only difference being small, so that it is advisable to add other points of difference, but this will at least serve to separate it from two other important forms.

NOTE—The drawings in this paper are collected from various authorities, and are not drawn to scale, so they do not at all indicate the relative size of the insect.—C. S. L.

It seems probable that it is merely a mechanical carrier of the diseases with which it is ascociated.

Glossina (tse-tse fly).

In this genus are three or four species connected with disease, of which *palpalpis* and *morsitans* are the better known, and which



are connected with "sleeping sickness." The wing venation is distinctive of the genus, the peculiarity being the remarkably curved course of the fourth long vein, which it seems to me is more easily recognized as a peculiarity of the discal cell, which is cleaver-shaped. The apical cell is almost closed, but that is also true in the preceding and following forms.

Stomoxys—

The wing here is less peculiar, the discal cell is not unlike that in *Musca*, but the fourth long vein curves up at the apex to form this characteristic flask-shaped apical cell.

Austen calls attention to the position of the wings when the fly is alive and at rest, those of *Glossina* lap entirely over each other, "like scissors," while the *Stomoxys* wings are divergent at the apex, and he says the flies may be distinguished in this way.

In glancing thus briefly at these various

wings their dissimilarity is evident, but the limits of this paper do not allow the comparison of these wing-forms with those of innocuous flies, likely to be confused with them, a suggestion as to the groups where this trobule is liable to occur is all that is possible.

In a general way the "midges" (*Chironomidae*) "fungus-gnats" (*mycetophilidae*), and "gall-gnats" (*cecidomyiidae*) are those most likely to be confused with the smaller forms. The wings of the "spear-winged flies" (*Lonchopteridae*) are a little like the *Psychodids*, and those of the "hump-backed flies" (*Phoridae*) are somewhat like those of *Simulum*, but although these resemblances must be taken into account, a little care soon accustoms one to the differences, and in some cases the general appearance of the fly will at once exclude it.

The wing of the "Horse-fly" (*Tabanidae*) is distinctive; there seems little likelihood of its being confused with that of any other family; *Musca Domestica*, on the contrary, is easily confused with several other flies, the wings being similar enough to be troublesome to those not used to handling them.

The "Tse-tse fly's" wing is distinctive not merely of the family and group, but of the genus itself; the peculiar discal cell is easily recognized, and is found in no other genus.

The Stomoxy's wing may perhaps be confused with some having a fairly wide open apical cell, but it is really a distinctive wing.

The neglect of the control of these insects is too broad for more than brief comment here. Every climate has its own conditions to meet, and the habits, feeding place, and manner of reproduction in the insect suggest the methods for control. Mosquitoes cannot be greatly reduced in numbers where lowland rice is grown, and those that develop in brackish water are hard to control; the house-mosquito is a comparatively easy problem, providing there is co-operation in the fight against it. Viviparous flies, like *Glossina*, cannot be fought in the same ways as egg-laying flies. The length of flight also complicates matters; petroleum cannot be safely put on fish ponds. For real success the conditions of climate,

insect, and the necessities of the people must be considered and methods evolved to fit the case in hand.

In reading the last paragraph of this paper some remarks were interpolated as to the control of the "Tse-tse fly" by means of sticky coats worn by the coolies at work, and, in the discussion which followed, Dr. Wellman took exception to this method and emphasized the destruction of the pupating grounds as of much greater value. When closing the discussion this point slipped my mind and I wish to accept Dr. Wellman's criticism, and add there seems a possible danger that the fly may seek new pupating grounds unless the destruction of the adults goes hand in hand with the destruction of the places now used for that purpose.

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DISCUSSION.

Dr. Creighton Wellman, New Orleans.—I hope I am not the only one to discuss papers at this meeting, but Dr. Ludlow's communication has interested me greatly, and one or two ideas occur to me in connection with it.

I agree with her that the classification of mosquitoes is in almost inextricable confusion. We need a Moses to lead us out of this wilderness. In no other group of arthropods is there such a great number of people rushing in to describe new species without comparisons of types, etc., as in mosquitoes. I would also deprecate—not that Dr. Ludlow advocates it—the attempt to name animals, including insects, in groups by people who are general entomologists and not specialists—and particularly by physicians, who are usually not general entomologists. When I came back from West Africa, I brought seven thousand natural history specimens, a large number of which were insects. I have been interested in medical entomology for a number of years. In that period, I have perpetrated a number of generic names and a couple of hundred specific names; but I should not think of doing this in any insects that I had not thoroughly studied. In the laboratory of our School of Tropical Medicine at New Orleans, in attempting to make a card index of titles in medical entomology, I have found hundreds of titles that are absolutely useless, although they cover valuable biological and pathological data, because the insects cannot thereby be properly determined. I would advocate sending the insects, not to a general entomologist, but to a specialist in medical entomology. If you wish to work with a species of mosquito first find out jut what it is by sending specimens of it to someone especially working with mosquitoes. The same thing holds true of other kinds of insects.

Another thing that I deprecate is the guessing at the role played by every blood-sucking insect that happens to come around, indulged in by some. In order to play a pathological part, the insect must be a common one, be closely associated with man, and suck blood repeatedly. Otherwise, it is a simple matter of mathematics to place its pathological role on a very problematic basis.

So far as these species and genera that Dr. Ludlow has discussed as being typical of medical entomology are concerned, this only illustrates the fact that the science of medical entomology, so-called, is a very broad one; because the insects or arthropods contained in it are of widely varying relationships. So far as the philogenetic significance of this wing ventilation is concerned (in which Dr. Ludlow is inclined to follow Comstock, as most entomologists do), I am not so sure of the final state of that question; but there is no doubt of their taxonomic value. The point that is most important for physicians and students of tropical medicine to take up is the working out of the distribution and the filling out of the gaps. There are hiatuses in the life history of almost all these insects, and the filling up of these gaps in the economics of these insects requires the gathering of data to help us in our work. A great deal of this guessing that is so rife among tropical medicine students is a thing that should be deprecated.

The matter of prevention might be commented

upon. I disagree with the view that it is a good thing to put sticky flypaper on the backs of the negroes while they are working, in order to see whether tse-tse flies are present. The best manner of clearing up the habitat of the tse-tse fly, the glossine, is based on the fact that a peculiar degree of shade and humidity is necessary for its reproduction. The clearing away of the timber in the fly belts, allowing the sun to shine there, is efficacious, because these flies wander only a few yards, at most, from the belts. This, to my mind, is the most logical means of reducing these flies.

Some of the other problems are exceedingly difficult. For instance—I would inject here, parenthetically, the remark that while no disease has been absolutely proved to be due to the l——m, it has proved to be a great pest. Its larvae must have a running stream, with a thin film of rapidly moving water, in which to develop; and it is generally undesirable to fill up that kind of streams. Therefore, the question is a hard one.

The problem of mosquito destruction, as our honored President tells you, is a live one in the city from which we both hail. We want to make a mosquito survey, similar to that which was made by Dr. White and his associates in the far-famed yellow fever times. The conditions have changed since that work was done, and I believe that the task of collecting carefully and patiently exact data, getting a foundation of facts from which to draw a deduction, will be of more benefit at the present stage of the problem than making a great many ingenious suggestions and hypotheses, which have little basis in fact.

These strictures are not on Dr. Ludlow's paper, because she did not attempt any such thing; but the idea occurred to me. It is a question in which I have taken a great deal of interest.

Dr. Joseph Goldberger, Washington, D. C.—I can hardly plead guilty of being an etomologist. There are, however, some thoughts that have floated through my head during the reading of the paper by Dr. Ludlow and the remarks of Dr. Wellman; and the point that I would emphasize was pretty well emphasized by him, but might bear some more discussion. That is this: That I think there is a great deal too much marked a tendency, not only in entomology, but also in all of the branches of medical zoology, to a very broad, superficial study. The number of species and of genera is certainly appalling. My idea is that the time has more than come when we need intensive study, rather than a superficial layer of insufficiently digested and poorly recorded facts; and this is the only point that I wanted to emphasize. It is true of both entomology and helminthology, the field in which I have been more particularly interested of late. The number of species and genera is simply unmanageable. Some of them have been adequately described, and others entirely inadequately. Even though they are adequately described, we need to know more about the life histories of the animal, and the way in which it breeds, lives and has its being; and I would plead that instead of rushing madly after new species, we try to learn something more about the species that we know already.

Dr. Ludlow (closing the discussion)—There are one or two points that I should like to speak about. In the first place, while I necessarily have an interest in the philogeny of my wing venation, I did not intend to bring it before you as a matter of moment, but to show the actual differences existing in these winged venations, which make a real means of differentiation of the group in one case, and of the species in a great many cases; so that those who have not had entomological training might be able to recognize groups of these insects with ease, and to send them to entomologists or work them out for themselves. I do not wish to force entomology on the profession. So far as the studying of flies is concerned, the study is surrounded with more difficulties than are usually recognized. The anopheles are especially shy, and it is not at all uncommon for people to insist that they have no anopheles in their vicinity, when a little more care would show that they do have them. A marked case of this occurred a few years ago, in one of our army posts, where malaria had been occurring for some time. The surgeon hunted for these mosquitoes; but, instead of sending the specimens of the mosquitoes found there to someone who really knew something about these insects, he did the work himself. He found no spotted winged mosquitoes until fall, and then discovered but two. He wrote an article in which he queries whether malaria could be transmitted by other forms of mosquito than the anopheles. Then he sent me the flies he had found, and they proved not to be mosquitoes at all. They were other forms, and not even closely allied to mosquitoes. They had no scales, but were bare-winged flies. The next year another doctor took his place at this post; and he sent me a great many mosquitoes. In fact, he nearly overwhelmed me with them, sending me a collection every day, with fifty to one hundred in each collection. Every one of these had to be looked at. It was, however, two months or more before the first maculopenis was found. This was not because this species had not been present before; it had evidently been there for years, but the people in that locality did not know how to collect.

I have had a report from a place in the Philippines that they had no anopheles there; but in the collection sent from that post I have found the wings of the anopheles in two specimens. One of these specimens was so badly damaged that one could not tell what genus it belonged to. They had no malaria at that post, but they evidently had the anopheles. When I was in the Philippines, I discovered, about three o'clock one afternoon a fly that I could not

place; but it was of the same species as the one afterwards sent me by the native. It is not usually a day-flying mosquito. A little later the two specimens were sent me from one place, and one specimen from another; but I have never found any more. They belong to a definite, new species. I have one specimen that is not only a new species, but probably a new genus; but it has not been described since. It is not a mosquito-carrying disease, however.

The question whether one should name a new form, depends upon several conditions. If you have a form that you cannot find described anywhere, you must describe it; but you may find it again, and you may not. That is why it is hard to base a classification on the sex. You may have a lot of female mosquitoes of a certain kind, but no male. You may wait a long while for your description, if you base it on the male genital organs.

SOME FALLACIES IN LABORATORY DIAGNOSIS.*

By CREIGHTON WELLMAN, M.D.,
Professor and Head of the Department of Tropical Medicine, Hygiene and Preventive Medicine, and Director of the Laboratories of Hygiene and of Tropical Medicine, Medical Department, Tulane University of Louisiana, Visiting Physician to the Charity Hospital, New Orleans, etc.

During the last few years great interest has been evinced by general practitioners throughout the South in the question of laboratory diagnosis of blood, intestinal, urinary and other forms of disease, and the value of a laboratory training has come to be recognized and highly prized. In point of fact, I sometimes wonder if the pendulum is not inclined to swing too far in the minds of certain observers and writers, and the laboratory be glorified into something apart from and superior to clinical acumen. As a laboratory worker of many years training and practice, I can perhaps say this without the danger of being accused of decrying my own specialty. I am as enthusiastic as any living man over the possibilities of the laboratory, but I have lived too long in laboratories not to be also alive to the limitations of laboratory technic and interpretation.

And since we have heard much on every side of the possibilities of the laboratory, I should like to say something in this paper about these limitations. In the limited space at my disposal it were better to attempt to deal with only one aspect of this wide subject, and I have chosen to discuss the limitations arising from fallacies due to faulty technic, artifacts, errors in interpretation, and similar puzzling features of laboratory experience.

We have all heard of discoveries of parasites of cancer that afterwards turned out to be simple cell inclusions, or pathogenic bacteria that were subsequently shown to be natural contaminations in distilled water, and of many other such anticlimaxes in the history of research and discovery.

The practicing physician in his daily routine task, also, is often in doubt of his apparent findings, and too many of us become discouraged and skeptical of all laboratory results.

The remedy for these drawbacks is not less laboratory work, but more laboratory work; and it is in the hope of pointing out some of the pitfalls surrounding not only the beginner but even the most experienced among us that the present paper has been written.

Perhaps my main points may be best illustrated by reviewing some of the principal difficulties and puzzles that may arise in two common laboratory procedures, namely, blood and feces examinations.

In blood work one meets with puzzles not only in stained but also in fresh specimens. Among the most important artifacts and natural phenomena that may be misinterpreted may be mentioned the following:

*Studies from the Laboratory of Tropical Medicine and Hygiene under the direction of Creighton Wellman, Medical Department, Tulane University of Louisiana—No. 17.

1. Flagellation of both erythrocytes and leucocytes may be mistaken for plasmodia or spirochetes. Those who have worked with blood kept above room temperature, e. g., in the incubator, are familiar with the curious changes in the erythrocytes which Balfour has termed "dumb-bell, droplet and filament phenomena." These distortions and attenuations of the red blood corpuscles may be produced even by using a recently heated platinum loop or a recently drawn pipette, so that care must be taken even in the most ordinary blood work. The filaments produced may, under dark ground illumination, with their mother cell, be mistaken for flagellating malarial parasites, or, if the filaments separate from the corpuscles, even be confused with pathogenic spirochetes. Ross and Macalister and Buchanan have shown that lymphocytes and myelocytes may also flagellate under special conditions, so that these bodies also must be borne in mind as possible sources of fallacy.

2. Blood platelets and hemoconia or blood dust may also be confused with malarial parasites. A careful study of normal blood is the best preventive of such mistakes.

3. Extraneous objects from the air or from apparatus may simulate various organisms in the blood. Instances have been recorded of the spermatozoa of wounded animals getting into blood smears and being described as protozoa. Insect hairs and cotton fibers have done duty more than once as supposed new species of filariae. Prout's *"Filiaria gigas"* is doubtless of this nature. But by far the most common mistake of this kind is the description of yeasts as blood parasites. These may be from the air or from the stomach contents of wounded or of laboratory animals. In one instance which was brought to my attention both a torula and a spirochete from the intestinal contents were through accidental contamination found in the blood and described as blood-inhabiting protozoa. The so-called *"Spirochaeta-bovis-caffris"* of Nuttall is probably an error of this sort, as are also the bodies described from the blood by Neave. The peritrichous ciliate (Cyclochaeta) described from the blood of a fish by the last named author, is also undoubtedly a contamination from the animal's gills. The avoidance of this class of mistakes is a matter of some difficulty, as the differentiation of such objects, especially of yeasts from protozoa, is not easy. It has been pointed out that the blood worker should never use any but virgin blotting paper for dry blood films, as corpuscles and parasites may be carried over from one specimen to another by means of soiled paper.

4. Faulty technic in fixing or staining may give rise to errors. Under this head may be mentioned the "mycoid" malarial parasite of Braddon which was described from fresh blood stained with methylene blue in a citrated solution and which is nothing but a stippling of the red corpuscle due to the use of a solution which is not isotonic. A large number of similar phenomena might be cited.

5. Certain elements in normal or pathological blood may show tinctorial characters that render them liable to be mistaken for bacteria or protozoa. A long list might be made of this class of phenomena. It is enough to mention the following: Cropper's bodies are spindle-shaped masses in the erythrocytes, which are probably to be identified with the nuclear remnants described by Cabot. The endo-globular degenerations of Maragliano are small areas devoid of hemoglobin in the red cells that have been described as piroplasmata and other parasites. Schleip's ring forms (*corps en anneau*), the "plasmosomes" of Ferrati, the Kurloff, Ensor and X-bodies are all interesting in this connection. The Kurloff bodies in the leucocytes have recently been shown to be normal elements of guinea pigs' leucocytes, and the X-bodies to be artifacts on glass slides. The Jolly bodies have also recently been thought by their discoverer to be due to hydration of the stroma of the red cells. In the writer's opinion the bodies in the blood of moles described by Graham Smith and also those reported by Barton and Darling in

human cases of varruga Peruviana should be carefully investigated to exclude their being merely granular or bacilliform basophilic areas. The azurephil granules of Naegeli (which probably represent degenerative changes in old erythrocytes), the metachromatic granules of Cesaris-Demel and Maurer's and Schuffner's dots need only simple mention, but should always be kept in mind in examining stained specimens of blood.

In a paper of this kind one cannot go into great detail, but I must mention the rosette-like extranuclear "centrosomes" of Ross, Moore and Walker occurring in leucocytes, and also the rings which have been described in the lymphocytes and which are likewise possibly centrosomes.

Before leaving the subject of blood examination, I ought to point out that fragments of macrophages, granules of eosinophiles and other leucocytic fragments may confuse the observer and lead him into mistakes.

Taking up now the matter of feces examinations, I suppose all of us when students in the laboratory have mistaken pollen and starch grains for ova of entozoa and vegetable fibers for the worms themselves.

I remember my own sending long ago of the macerated seed pulp of a grape fruit to a helminthologist as a probably new trematode! I have more than once had banana fibers sent to me as portions of tape worm. Celery shreds have often been mistaken for hookworms. Besides pollen, the ascus of a mould might easily be mistaken for an ovum of a worm.

An interesting piece of research appeared a few years ago in which the writer, Royal, experimentally ingested large quantities of various vegetables and fruits, making the diet for the day consist of one article. At various intervals afterwards he examined his stools and thus became familiar with the character of the various vegetable fibers after they had passed the length of the intestinal tract. I have long been in the habit of giving my students a lesson in the structure of the commoner vegetable foods before taking up advanced feces work. Much further investigation remains to be done along these lines. Various chemical tests for starch and cellulose are of much value in differentiating unknown objects in feces.

It is not my object on this occasion to present any exhaustive discussion of the difficulties attendant upon laboratory examinations of tissues or excreta. The examples above cited are but illustrative. The subject is large and much has been written upon it, but it seemed to me that to point out some of the snares along our pathway might be a practical and useful utterance; and if I have but reminded you how many sources of error surround us constantly I shall have achieved my purpose.

In closing, I would insist again upon the fact that the laboratory side of diagnosis, valuable as it is, is not the whole nor even the larger part of the science. Let us by all means cultivate it. This paper is an attempt to encourage and not to discourage beginning laboratory workers. But let us not fall into the error of deifying laboratory results. The sources of error are too many and its limitations too great to allow it to stand alone. It must go hand in hand with careful and scientific clinical work. To the general practitioner I would repeat what one of the greatest laboratory geniuses Germany has produced is quoted as having said to a student, namely, that the doctor must first be a good clinician and second a laboratory expert, and he should remember that even from the laboratory point of view his stethoscope is of more importance than his microscope and his percussion finger of more value than his entire laboratory outfit.

While this statement is doubtless too strong in the present connection, still it is a useful emphasis on a neglected fact, and both clinical and laboratory workers should unite in bringing about closer cooperation between exponents of these great methods of advancing our knowledge of medicine.

THE RELATION OF THE RAT TO THE PUBLIC HEALTH.*

By E. W. WARREN, M.D.,
Palatka, Fla.

The bacteriologist, the pathologist and the epidemiologist have contributed greatly to our knowledge within the last decade or so with reference to the modes of transmission of contagious and infectious disease. They have elucidated the fact that many creatures that were formerly looked upon as pests only are in reality a means of transmission of deadly disease. Not only have they demonstrated to us the means of transmission, but in doing so they have in almost every case discovered and pointed out the means of prevention. They are rapidly giving us system, method and protection for the chaos that prevailed before.

It is a well-established fact that the mosquito transmits malaria, yellow fever, dengue and filariasis; that the tsetse fly carries the dreaded sleeping sickness in Africa; that rats, mice and ground squirrels through the fleas that infest them transmit bubonic plague and possibly leprosy. The housefly multiplies her accomplishments by being able to distribute several different diseases with the utmost impunity to herself. Many other creatures are under grave suspicion, as the cockroach, ticks, gnats, bedbugs, body lice and oysters.

But it is with the rat that this paper expects to deal mainly. From an economic standpoint the rat is an enormous factor. The loss caused by them annually in the United States is variously estimated at from thirty-five to fifty million dollars. In 1838 the number of rats killed on a single plantation in the island of Jamaica was 38,000 and the damage done to the sugar plantations that year was thought to be not less than a half million dollars. In 1881 the Indian Famine Commission reported to the English Parliament that the suffering of the populace was largely increased by the destruction not only of food supplies, but of growing crops by the little rodents. Rewards were offered for their destruction and over twelve millions were reported killed in a short season.

Rat migrations have been reported. Pallas narrates that in 1727 great hordes appeared from the east at Astrakan, in southeastern Russia. They crossed the Volga in vast armies and devastated the country, and almost as suddenly disappeared, in all probability from some epidemic among them. An invasion of rats in the Bermuda Islands occurred in 1615. They increased to such an alarming extent that they devoured practically everything in their way, so that for a year the population was almost destitute of food. In 1877 an invasion of rats occurred into Caline and LaFayette counties, in Missouri. 'So great was their numbers that serious loss to grain and poultry resulted. In South America these migrations are to a certain extent periodical, occurring in Brazil at intervals of approximately every thirty years; and in Chili about every twenty-five years. In 1878 in the State of Parana the whole of the crops of corn, rice and mandioca were destroyed by them, causing a serious famine. In 1903 a multititude of rats spread over several counties in western Illinois. An eyewitness describes one moonlight night having heard a general rustling in a field, was greatly astonished to see an army of rats cross the road. They stretched away as far as the eye could see in the dim light. Three thousand four hundred thirty-five were killed by one farmer on his premises.

The menu of rats is much more comprehensive than is at first thought. It includes grains, cereals, fruits, vegetables, bark, bulbs, roots, stems, leaves, eggs, young chickens, ducks, rabbits and especially squabs, butter,

*Read by title before the Florida State Medical Association, May 10, 11 and 12.

cheese, meats, etc. Their feeding habits resemble squirrels in their manner of holding their food between the forepaws while eating. After eating they brush their mouth and whiskers with their paws until clean. They generally feed mostly after sunset, and are great water drinkers.

Their ferocity has been grossly exaggerated. Stories of their attacking sleeping children and sick people have slight foundation in fact. They defend themselves by biting, but their bite is not poisonous. When pressed by hunger they become cannibals, destroying the weaker ones.

They probably do far less harm in the destruction of food and crops, etc., than in their capacity as disease carriers. Their history as transmitters of disease extends back into antiquity. The book of Samuel makes mention of a pestilence having reference to rats and mice; and in the hopes of its abatement offerings of golden images of the little creatures were made by the Philistines.

PLAGUE.

The rat is a known or a suspected factor in the transmission of several different diseases, but for the present and possibly for some time to come the most important thing for us is his relation to the spread of bubonic plague among human beings. Not only is there evidence that they are the means of spreading it in epidemic form, but in all probability they are directly responsible for its going from place to place, even across continents and oceans; for they are great travelers in the holds of vessels and railway freight cars. They transmit the disease to other animals, as ground squirrels, guinea pigs, and possibly others. It is stated that in places in California trappers have caught more rats than squirrels in the squirrel burrows. This indicates the ease of transmission between these little neighbors. In recent experiments carried out by the United States Public Health and Marine Hospital Service in California a certain number of fleas were taken from rats infected with plague and allowed to bite six ground squirrels. Three of these squirrels died in a few days of plague. Fleas from the dead squirrels were allowed to bite a second series of six squirrels and two of these died of plague. Fleas from the last dead were allowed to bite rats and again the disease resulted. Of course, this is all made possible by the activities of the flea, a parasite common to a large per cent. of living creatures.

Pathologically there is little of unusual interest in a rat infected with plague. But it is well to study the rat in its reaction to the bacillus pestis. The characteristic lesions produced by plague in man and laboratory animals are so marked that we would expect to find the same in rats, and such is the case. It is comparatively easy to make a diagnosis from the gross lesions in all but the atypical cases, with a reasonable degree of certainty. Even the unskilled attendants in the quarantine service in the infected area are soon able to recognize it. The bubo is the most reliable sign and is enough to base a diagnosis that rarely proves wrong. In rat leprosy the lymph glands enlarge to greater proportions.

There is a form of glandular enlargement in old rats that is entirely benign. To the practical observer the differentiation is a relatively easy matter. The bubo is caseous and is easily shelled out, but the feel is hard and firm, it never reaches the large proportions of the leprosy gland. The latter are recognized mainly by their large size and lack of surrounding infiltration. The large indolent gland of the old rat is elastic and leathery and without any evidence of illness in the animal. Observers differ as to the location of the primary bubo; axillary inguinal, submaxillary and cervical glands being variously accused by different authors. Two different lesions of the liver are looked for in a plague-stricken rat, viz., what is termed by the Indian Plague Commission as fatty liver and striped liver; the former found by the microscope to be minute necrotic areas, while the latter is or appears to be a sort of mela-

nosis. The spleen is found to be markedly dark, firm and granular and friable. Pleural effusion is a constant symptom in rat plague, but is rarely ever found in other rat diseases. The gross lesions in rat plague are often so inconclusive that the microscope is necessary to determine the disease. The B. Pestis can scarcely ever be isolated except by cultures. But it has been found unsafe to depend entirely upon cultures, inoculations being resorted to when great certainty is desired.

A large percentage of rat immunity was found to exist both by the Indian Plague Commission and the officers of the United States Public Health and Marine Hospital Service in San Francisco. At least fifty per cent. of those artificially inoculated failed to become infected.

Summarized from reports of the Indian Plague Commission and of the U. S. Public Health and Marine Hospital Service.

Medical News From Florida

On the 8th, 9th and 10th of May there was held at Tampa the annual meeting (of which we give a report on another page) of the Florida State Medical Association. Dr. J. S. Helms, of Tampa, was elected President for the ensuing year, and Miama was chosen as the place of meeting for the annual gathering in 1913.

Honorary Degree Conferred

At the eighty-first annual commencement of Wesleyan University, at Middletown, Conn., held on June 19, the degree of Doctor of Laws was conferred upon Dr. Amos J. Givens, proprietor of Givens' Sanitarium for nervous diseases at Stamford, Conn.

Rural Sanitation

By W. C. RUCKER, M.S., M.D.,
Assistant Surgeon General, U. S. Public Health and Marine Hospital Service.

The happy days of childhood
I often call to mind,
I love to live them o'er again
By memories' light refined—
The orchard and the meadow,
And the loft of fragrant hay,
The garden and the privy,
And the well not far away.

The farm yard with its litter
Of manure round about,
The milking shed where flies galore
Flew buzzing in and out.
The pig-sty and the chicken house,
The hens that scratched all day
In the ground beneath the privy
With the well not far away.

We took our joys and sorrows
As they chanced to come along,
My brother had the ground-itch
And he didn't grow up strong,
And Mary died of fever—
It was might sad that day—
But we didn't blame the privy
Nor the well not far away.

In the summer time, mosquitoes
Used to sing the whole long night,
But we would keep the windows closed
And thus avoid the bite,
But Billy got the ague
And Lizzie pined away—
Mosquitoes—foul air—privy,
And the well not far away.

We used to think that death was just
A punishment for sin—
The sin of ignorance I say!—
So let us now begin
To try and get the windows screened
Put open night and day,
And a sanitary privy
With the well quite far away.

Let's clean the cows at milking time,
Let's clean the barn yard, too,
Let's rid ourselves of fevers
And the chills and ague crew,
Let in the air and sunshine
But drive the fly away,
With the ancient typhoid privy
With the well not far away.

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Next Meeting Jacksonville, Fla., November 12, 13, 14, 1912.

The Tropical Medicine Number

Our readers cannot fail to be pleased with the literary and scientific treat the JOURNAL presents in this number. Most of its space is devoted to the consideration of diseases that prevail more extensively in such climates as ours, and which are generally included in the term "Tropical Medicine." Many of the writers whose papers appear in this number are known wherever our language is spoken and are acknowledged authorities on the subjects on which they write.

Probably the information regarding semi-tropical diseases presented in this number of the JOURNAL is more comprehensive and practical than can be found anywhere else assembled in such condensed form.

Four principal subjects demand our most earnest attention. They are malaria, pellagra, bubonic plague and uncinariasis. Each of these receives careful attention from men competent and experienced. Most of the papers were first read before the American Society of Tropical Medicine. The creation of this learned body was most opportune, coming at a time when uncinariasis so suddenly sprang into great importance, when pellagra was discovered and recognized, and when bubonic plague had begun to threaten us from the distant East.

The men who conceived and accomplished its organization deserve great credit for their foresight and executive ability. As usual in such cases, the burden of organization devolved chiefly upon the Secretary, Dr. John M. Swan. By his activity and ability he did much to draw together in one body the eminent gentlemen who now compose the society.

The subjects pertaining to Tropical Medicine have always been prominently featured by this JOURNAL. The overwhelming importance of malaria has been constantly insisted

upon; uncinariasis and pellagra have repeatedly been given special prominence. Editorials have been published warning health officers of the approach of bubonic plague and suggesting the proper precautions against the importation of infected rats. It is evident that the combined efforts of the American Society of Tropical Medicine, the Tulane School of Tropical Medicine, the New Orleans Medical and Surgical Journal and the SOUTHERN MEDICAL JOURNAL have borne good fruit, for never before have our physicians all over the South shown such a lively interest in Tropical Medicine.

The American Society of Tropical Medicine

The ninth annual meeting of this Society was held at the Hotel Rudolph, Atlantic City, on June 3d, 1912. The President, Dr. Joseph H. White, of New Orleans, proved to be an efficient officer, pleasant and alert. By holding discussions strictly within time limits he enabled all who wished to be heard to secure attention, and the result was a great increase in interest.

The President's address was devoted to "The Eradication of Malaria." It appears as our leading article in this number. Several other valuable and interesting papers which were read by members are also published in this number, and more are to follow. One of the most important announcements made was that by Dr. Creighton Wellman, to the effect that Dr. C. C. Bass, of New Orleans, has succeeded in cultivating the malarial parasite *in vitro*, a feat heretofore generally considered impossible.

Beri-beri, Gangosa, Pellagra, Bubonic Plague, the Tse-tse Fly, Rats and Their Relation to Disease, were some of the subjects considered.

The officers elected for the ensuing year are: President, E. R. Stitt, of Washington, D. C.; Vice-Presidents, R. A. Strong, of Manilla, and Creighton Wellman, of New Orleans; Secretary, John M. Swan, of Rochester, N. Y.; Assistant Secretary, Allen J. Smith, of Philadelphia; Treasurer, C. L. Forbush, of Philadelphia.

The Society is further considered in another editorial.

Commission for the Study and Prevention of Malaria

One of the most important acts of the Southern Medical Association at the Hattiesburg meeting last November was the creation of the commission above mentioned. It is composed of nine members, appointed by the President of the Association, Dr. J. M. Jackson, of Miami, Fla. They are as follows:

Dr. Charles F. Craig, U. S. S., Washington, D. C., Chairman.

Dr. Graham E. Henson, Crescent City, Fla., Secretary.

Dr. R. H. von Ezdorf, U. S. P. H. & M. H. S., Mobile, Ala.

Dr. William Krauss, Memphis, Tenn.

Dr. Creighton Wellman, New Orleans, La.

Dr. William H. Deaderick, Marianna, Ark.

Dr. W. S. Thayer, Baltimore, Md.

Dr. Seale Harris, Mobile, Ala.

Dr. C. C. Bass, New Orleans, La.

The gentlemen composing the commission are widely known for their interest in the subject and their efficient researches into the problems presented by malaria. The work already achieved by some members of the commission has won the attention and admiration of scientific men everywhere. Within the limits fixed by circumstances the commission will do an immense amount of good, but the subject is too vast to be mastered by efforts within reach of any association whose finances are at all limited. The work undertaken is not for the benefit of any association or any state. It is for all humanity, and it is to an organization such as this that the world must look for emancipation from its greatest drawback, its chief cause of poverty, sickness and death, its most merciless foe, malaria.

The commission should receive support from

the national government, for more than in hydraulic engineering or forestry or any other of the numerous cares it assumes should it be interested in the effort to so learn the uttermost facts about this protean parasite that it may be abolished entirely. This is a view of the matter that is entertained by very many people.

The American Society of Tropical Medicine has passed resolutions endorsing the creation of a United States Commission for the study and prevention of malaria and the appropriation of funds for its support. The government will seek long and far before it will find a commission more fit and able for the purpose and more worthy of financial support than that appointed by President Jackson.

The able gentlemen who represent this part of our great country in Congress can serve well their constituencies and their own futures by taking up the above suggestion in some form or other, and thus arming and equipping a force to fight one of the most insidious and fatal foes to humanity.

What Malaria Costs Alabama

Dr. Graham E. Henson, of Crescent City, Fla., who has an interesting article in this number of the Journal, has been doing some valuable work for the malaria commission appointed by Dr. Jackson, the President of the Southern Medical Association.

He takes the records of the three largest cities in Alabama, Birmingham, Mobile and Montgomery, regarding the death rate from malaria, and assumes that the same rate per thousand of population prevails throughout the State, draws his conclusions.

His estimate must be very conservative, as there are more malarial cases to the thousand in the country than in the cities. Nevertheless his results are surprising.

He thinks there were over 70,000 cases in Alabama last year with over 770 deaths, and figures the loss in expenses, lost time and deaths at a total of over $2,000,000. Surely such a matter is worth attending to by the best intelligence of the State.

Dr. Henson deserves praise and thanks for his careful, persistent work in this direction.

The Tulane School of Tropical Medicine

The medical profession, everywhere, is to be congratulated upon the above-named addition to the many important features of that justly-celebrated university at the mouth of the "great river." That majestic stream affords direct maritime communication with all the world, but more especially with the countries and islands of the tropic seas which furnish its nearest commerce. Hence it is that New Orleans offers greater facilities in the way of clinical material for the study of tropical diseases than any other port in our country. The hospital facilities are ample and are utilized to the best advantage.

One of the most valuable features of the school is the eminent character of its instructors and the enthusiasm and efficiency of their work.

Without naming them all, the Journal calls attention to the work of Dr. Creighton Wellman, who is at the head of the Department of Tropical Medicine and is the Director of the Laboratories of Hygiene and Tropical Medicine in the Medical Department of Tulane University of Louisiana. Those who have read the volumes of the Transactions of the American Society of Tropical Medicine cannot fail to remember that he is one of the most active and valued workers, and contributes a large part of that valuable literature.

Another famous member of the teaching staff is Dr. C. C. Bass, whose researches in malaria have added another step to the march of science against that disease. He has accomplished the longed-for task of *cultivating the malarial parasite and in following out in detail the entire schizogeny.*

This has been pronounced by competent authority to be "an epochal feat, worthy to stand

beside the discovery that the mosquito is the host of the malarial parasite."

Dr. Howard Kink, who, at his own expense, has visited and personally investigated conditions in plague-infected parts, particularly on the east and west coasts of South America, is another of Tulane's physicians who has performed distinguished service for the advancement of scientific medicine.

With such instructors, assisted by a competent corps of experienced teachers, guided and directed by their able Dean, Dr. Isidore Dyer, and situated at the converging point of tropical commerce with a large part of this country, the Journal feels justified in making the statement with which this article begins: "The medical profession, everywhere, is to be congratulated upon the establishment of this School of Tropical Medicine."

Thirty-Ninth Annual Meeting of the Florida State Medical Association

The first business session was called to order at the music room of the Tampa Bay Hotel at 10 a. m. on the 8th of May, with about fifty members present, almost half of them from the City of Tampa. Rev. C. W. Duke, the eloquent pastor of the First Baptist Church, delivered the invocation. An address was made by Mayor McKay, welcoming the members of the association in behalf of the City of Tampa. Dr. A. H. Freeman, of Starke, President of the State Medical Association, read the annual official address, to which the President of the Hillsborough Medical Society, replied. The Secretary reported the seeming little interest taken by the different county societies in sending delegates to the meeting.

Dr. U. S. Bird, of Tampa, read the first paper, on "Clinical History." The second paper, "Some Considerations on Dysmenorrhoea," was read by its author, Dr. Henry B. Holden, of Jacksonville. The next paper, "Constipation and its Treatment," by Dr. D. W. McMillan, of Pensacola, was read by title on account of the author not being present. "Report of a Case of Primary Atrophy of the Conjunctiva" followed, read by Dr. L. A. Bize, of Tampa. A general discussion succeeded to the reading of those papers.

In the afternoon meeting of the 8th some more papers were read, and at 8 o'clock in the evening Dr. Raymond C. Tuck, of Jacksonville, delivered an oration on "Advances in Surgery."

The second business session was opened at the same place where the first was held. The presidential chair was occupied by Dr. J. S. Helms instead of Dr. A. H. Freeman. The papers read were: "The Treatment of Gastric Ulcer," by Dr. Thos. Traelson, of Tampa; "Notes on Pellagra," by Dr. C. P. McCall, of Apopka, and some others.

An invitation to the members to visit the new laboratory of the State Health Board, at Tampa, was tendered by Dr. Joseph Y. Porter, State Health Officer of Florida.

On the morning of the 9th the election of the officers for the coming year took place. Dr. J. S. Helms, of Tampa, was the winning candidate for President; Dr. G. E. Henson, of Crescent City, for First Vice-President; Dr. J. G. DuPuis, of Lemon City, for Second Vice-President; Dr. M. L. Crum, of Bowling Green, for Third Vice-President; Dr. W. S. Manning, of Jacksonville, for Librarian. There was no election of either Secretary or Treasurer. These two positions are filled by one single person, and are for the lifetime of the present incumbent. Miami was chosen as the place for the annual meeting in 1913.

The afternoon and evening of the second day was spent in entertainments in and about the city.

On the morning of the 10th a few more papers were read, but a number of members had already returned to their homes. The closing exercises had a very small attendance. —(Reported.)

Observe; Reason; Record

The benefits to our profession and to humanity that result when a thoughtful doctor carefully analyzes and makes notes of such

cases as show marked or unusual features is well illustrated by two papers read before the State Medical Association of Texas, one in 1909, the other in 1911, and subsequently published in the Texas State Journal of Medicine.

The subject of one paper is "Atropia," and of the other "Puerperal Convulsions." The author is Dr. I. L. Van Zandt, of Fort Worth, Texas. He is over 70 years of age, having graduated in 1866 and begun practice in a malarial region where the algid or colliquative forms of "congested chills" occasionally appeared. At first he followed the regular treatment for relief of the terrible condition, but after losing three patients in succession he tried a new plan. The cold, blue, drenched skin and colliquative diarrhoea, simulating cholera, suggested efforts to rouse the paralyzed tissues, check hyper-secretion and warm the surface. Having no atropin he began giving quarter of a grain of extract of belladonna hypodermically, rubbed up with a little warm water, and repeating in an hour if necessary. The result was prompt relief. Latterly he has given atropin freely, 1-60 of a grain doses, and a second dose in thirty minutes if needed. Sometimes he adds strychnine, 1-30 or 1-20.

He has learned to rely upon atropin in all cases of colliquative diarrhoea. A dose of atropin by the mouth an hour before a laxative enema he finds very useful.

The other paper, its subject being "Puerperal Convulsions," is noticeable for two reasons. It is the verdict of long continued, intelligent, clinical observation on two important points.

First, it is harmful, instead of helpful, to force delivery on women with eclampsia. This seems also to be the opinion of some noted investigators, of whom he quotes Herman and Stroganoff. "If labor has begun, hurry it up," but do not induce it, seems to be his idea.

Second, he controls the convulsions with 10 to 15 drop doses of Norwood's Tincture of Veratrum Viride, hypodermically, then gives a large dose of some saline laxative. Purgation must be secured even if croton oil, one to two drops, is necessary. He repeats the veratrum as often as needed to keep the pulse about normal. He encourages sweating by hot, wet towels about the body, enveloped in dry ones. He does not hesitate to use chloral when needed.

Third, he gives the veratrum without waiting for convulsions when, in the last stage of pregnancy, a woman has much albumen in the urine and suffers with headache to any degree, and finds it gives prompt relief to the latter. He also insists on warm underclothing. There are many other valuable, practical points in these papers.

They demonstrate the value of intelligent observations and records.

A Progressive Medical Officer

It is not only in politics that men are looking into the conditions that govern affairs of general interest.

In various localities the health officials are showing an activity in the management of things hygienic or otherwise that is worthy of praise. This Journal takes great pleasure in commending the energy and courage displayed by some of them in braving the displeasure of men who have for years considered public office a private snap instead of a public trust, and have failed to use for public benefit thousands of dollars that should have been thus expended.

Among the many health officers whose work has been conspicuous for its efficiency, Dr. Oscar Dowling, State Health Officer of Louisiana, merits a leading position.

In every point of duty he has been prompt and active, and so far has met with no defeat. Just at present he is engaged in an effort to redeem from their filthy condition the public markets of New Orleans. No one who has passed within smelling distanec of them in warm weather can doubt the righteousness of this effort.

True, the markets are not all equally in-

sanitary. It is said that some are better, others worse, but principally the latter. The flies, however, are all equally insanitary and disgusting. Swat 'em, doctor; swat 'em, and swat their aiders and abettors also at every rendezvous of bad odors, filth and flies. They are out of place in this twentieth century.

Worse Than the Empty Pistol

Involuntary manslaughter with poisons is becoming so common that measures should be taken to at least moderate the ghastly record. The doctor prescribes a dozen "Blue Anti-Septic Tablets." "Directions, dissolve one in a quart of hot water and use as a douche."

They are very beneficial, and the patient has the box refilled repeatedly without the doctor's knowledge. Presently debility, pallor, diarrhoea and indigestion ensue, pepsins and tonics avail not, and perhaps not only after death is it learned that for months before her last, brief illness the woman has been saturated with bichloride of mercury every day. Or some lady, finding it inconvenient to dissolve the tablet (7½ grains) of bichloride in a quart of water, puts it in a common tumbler to dissolve and then forgets to use it. A neighbor comes in, pours fresh ice water on the tablespoonful or so already in the glass, and drinks it. Fortunate is she if the mistake is discovered at once. In ten minutes if the stomach was empty, it was too late. If right after a meal, chances are some better. These same tablets are widely used for protection of unlawful pleasures, but only in solution. We have read that a man now labors in a prison because he persuaded his bride to use the solid tablet.

In spite of skillful attention, she suffered a lingering death. Yet we see those tablets frequently in places easily accessible in spite of their character; just as many bath-rooms have bottles of carbolic acid handy, when a little harmless copperas (iron sulphate) is so much better as a deoderant; just as so many bureau drawers harbor the supposed-to-be unloaded pistol, where the children may find it. Who will begin the work of correcting these evils and how?

Danger Ever Present

Few people realize how constantly present are conditions, most of which may at some unguarded moment infect them with the germs of serious, perhaps fatal, illness. The earth, the air, the water; heat and cold, drouth and wet; each has its perils. Were one to meditate too much upon the list it would make one conclude that the most perilous thing in the world was living. One would sympathize with Mark Twain's fear of going to bed "because so many people die there."

Mosquitoes wield their malarial hypodermics; flies, food and drink convey the typhoid bacillus; rats and squirrels carry the plague laden flea to poison the dwellers in tropic lands, and the bite of the tse-tse fly brings on the sleep from which one cannot waken.

The germs of tuberculosis are supposed to ride the dust-laden air ready for inhalation by susceptible lungs; parrots, kittens and canaries can harbor the Klebs-Loeffler bacillus and the unknown infection of scarlet fever and measles; your favorite horse may give you the Judas kiss of glanders and your faithful dog may inflict the horrors of hydrophobia. These are dangers to be avoided by constant watchfulness, but there are others that strike so unexpectedly that caution avails but little.

The telephone receiver at your ear or the switch of your electric light bulb as you manipulate it may at any moment be crossed by a broken trolley wire, and that is the end of things. Trackless locomotives with young or incompetent drivers go dashing along and across the streets day and night leaving a trail of dead and wounded; trains are wrecked, boats sink or burn, conflagrations are common. Altogether one would conclude, looking at life from such a viewpoint, that the

expectation tables of the life insurance companies are but rosy illusions based only upon hope. But, after all, few of us are quite ready to give up the ship. Doctors, in particular, are in no mind to go just now when in every department of medicine and surgery such rapid and wonderful progress is evident, and when the qualifications now required of both student and graduating physician promise such a splendid fruition in the coming generation of doctors. May we all live to see and enjoy it.

Educational Sanitariums

The Journal desires to call the attention of physicians to the fact that there is arising a new class of sanitariums, one of which, the Oak Leigh Sanitarium, Lake Geneva, Wis., presents its claims in an advertisement in this issue of the Journal.

These sanitariums educate the mentally deficient, not only those merely backward, but those with mental disease following meningitis, those with dementia praecox, cerebral palsy and epilepsy, and other mental and physical defects. For the education of such children and young people, only teachers of the best scientific training should be employed, but with such teachers in charge and in plenty, the results are such as to astonish all who have not witnessed them.

Health, like truth, is a uniform type, but disease, like error, has infinite types. It results from this fact that abnormal children cannot be educated in classes. Methods of instruction and discipline that will train for a safe and sane manhood all normal children will actually injure the weak-minded and weak-bodied when subjected to them. Thus children of the lower grades of body and mind will be further degraded when placed in our ordinary schools.

These educational sanitariums provide a home life that meets every need of these unfortunate young people. They are given the fullest companionship any home gives to its loved ones and all the individual instruction that each pupil should have. It is because a study of the needs of each individual case is made by teachers specially trained in methods for the development of the feeble-minded that we find these pupils given a large measure of out-of-door life and a large experience in doing things within the limits of the powers of each case. Through such measures all cases above the idiocy class are improved, and some of them reach the strength of body and mind to enter the schools for normal children.

The Journal welcomes the advent of educational sanitariums, and recommends to physicians to advise certain types of children sent to them—the earlier the better. The younger the child in all cases the more a given training can do with him.

Ten Pellagrins in One Family

Dr. J. E. Knight, of Waycross, Ga., reports an instance of ten pellagrins in one family, father, mother and children. Where did they get it, would you ask?

The following quotation from his report in the A. M. A. Journal June 22, 1912, explains: "A specimen of the corn meal used was examined and found unfit for human consumption. The patients said that on several occasions the meal bought would be so moldy before it was used up that they fed it to the stock on the place. Corn in all forms was prohibited to these people, intestinal antiseptics were prescribed, and at present all are doing nicely."

Change of Address

In systematizing street names, the name of the street on which Drs. Pettey & Wallace's Sanitarium is located, has been changed from South Fourth to South Fifth Street. Please bear in mind that this change of address does not involve a change of location of the institution. Their new address is 958 South Fifth Street, Memphis, Tenn.

Solid Food for Typhoid Fever Patients

The Virginia Medical Semi-Monthly for May 10, 1912, publishes a paper by Dr. G. C. Rodgers, of Elkins, W. Va., the same being previously read before the Medical Society of Virginia, October, 1911. In his paper Dr. Rodgers tells us how he has fed his last 200 cases of typhoid fever a liberal diet discarding the "all liquid" idea entirely and losing not a case. He believes the slow starvation called "liquid diet" reduces the fighting strength of the patient and is an ally of the disease.

He scoffs at the danger of good, solid food punching a hole through the weakened bowel wall, and considers sweet milk the most dangerous diet on account of the generation of gas. In this series of 200 cases there were no deaths, no perforations, five small hemorrhages and only one case of marked distension, as he gave no milk.

He disapproves Coleman's plan of re-enforcing a sweet milk diet with "from four to six eggs and from one to two pounds of milk sugar daily." Such a diet would be apt to disagree even with healthy digestions. His experience teaches Dr. Rodgers that typhoid patients do not thrive on a nitrogenous diet, but that carbohydrates agree with them and "markedly control the loss of tissue nitrogen." The diet on which this series of cases were fed was about as follows:

8 a.m., two or three slices of bread, plain or toasted, with butter at will; a saucer of some cereal breakfast food (boiled not less than three hours), with cream and sugar; one cup of tea or coffee, with cream and sugar if wanted, and often one soft-boiled egg, or the juice of an orange. At 10, 12, 3, 6 and 9 o'clock more nourishment of a similar character is taken. Twice a small glass of buttermilk is allowed. The doctor calls attention to the physiological fact that the act of chewing stimulates not only the salivary glands, but also every other secretion concerned in digestion, and ascribes his success to using foods requiring mastication when feeding typhoid patients.

A large and increasing number of physicians are thus using solid foods, but there is one consideration which causes frequent hesitation, and that is, the kind of cooking so many helpless patients would have to depend on in private houses, and sometimes in hospitals where supervision is slack. The question is still open.

News of General Interest

The following dispatch flashed by "Marconi Transatlantic Wireless Telegraph" to the New York Times will be a welcome bit of information to those members of our profession who are so fortunately situated as to take advantage of it. The themes of his lectures are under earnest consideration at the present time, and the elucidation to be expected from the celebrated Vienna physician will justify large and appreciative audiences.

The "Marconigram" is as follows:

Vienna, June 8.—Prof. Carl von Noorden, a celebrated member of the Medical Faculty of Vienna University, who is going to New York in September at the invitation of the Post-Graduate Medical School, to deliver a series of lectures, will also go to Washington to take part in the International Hygienic Congress as the official delegate of the Austrian government. He has also accepted invitations to lecture in a number of other American cities.

The professor has selected as the theme of his lectures the progress made in the treatment and cure of diabetes and kidney troubles as well as the science of dietetics.

Prof. von Noorden will return to Vienna by the middle of November.

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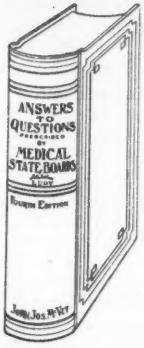

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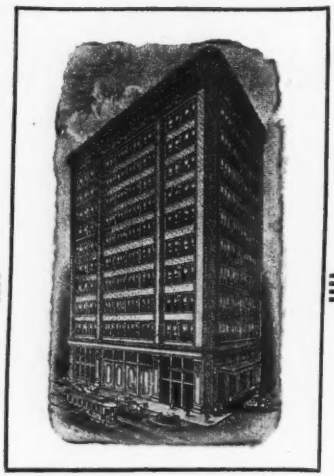

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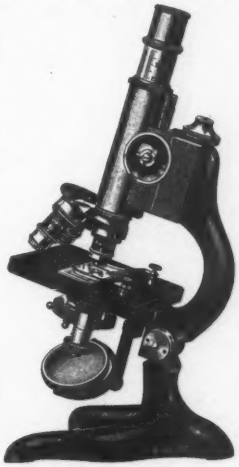

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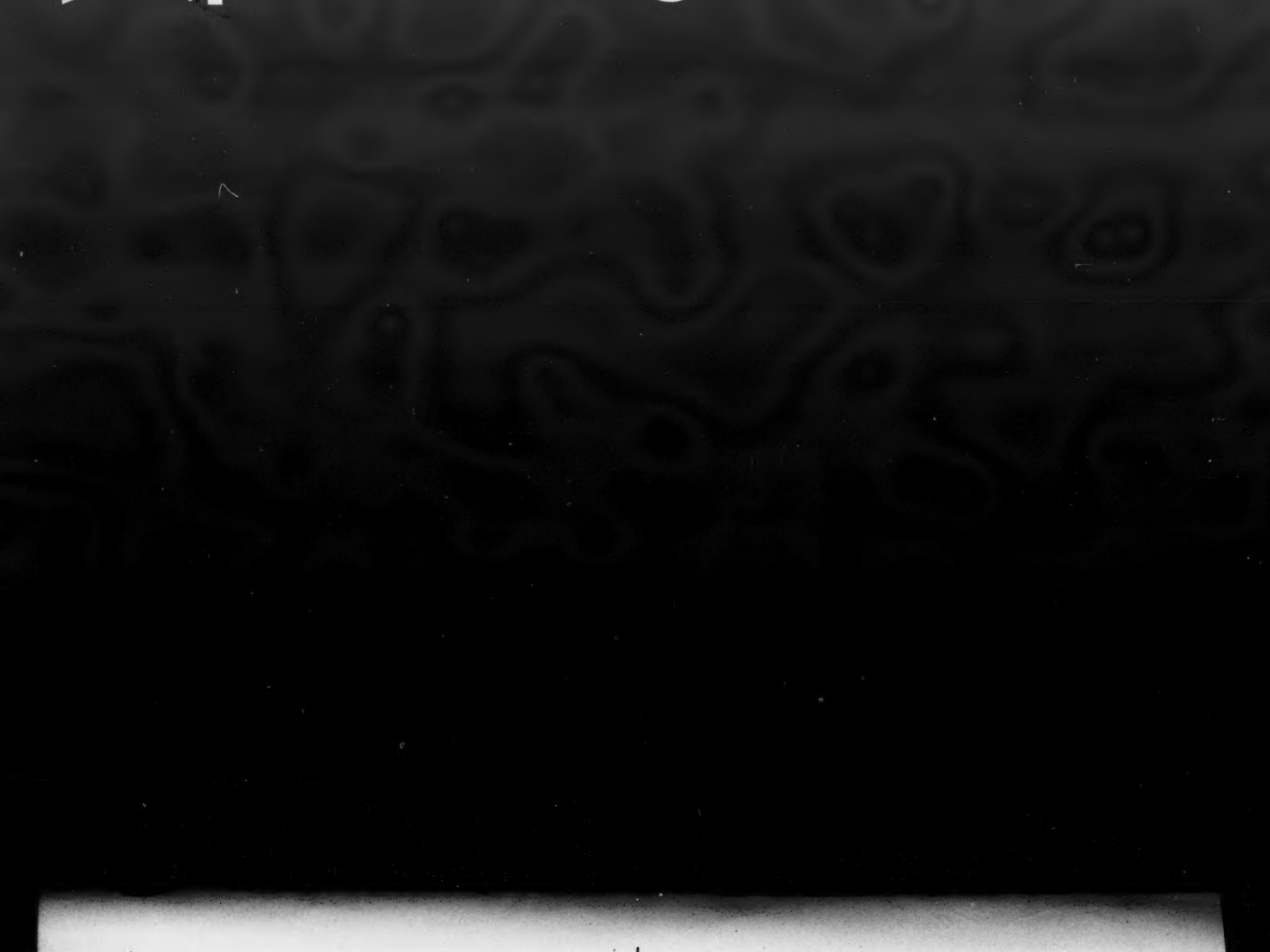

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